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CHAPTER #78
NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

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Fellow Horologists:

You will note the changes in this issue in our Mart pages... the ads have been updated with the changes as supplied by the advertisers, with many removed entirely. This is in accordance with Mart ad policy eliminating those that are no longer current unless we have been advised to continue the existing copy.

An apology is due to Jan Bosscheiter of the Netherlands who graciously supplied the Brillie material which appeared in our issue #4 of 1996. We gave credit to Dr. George Feinstein for his efforts in the translation, but neglected to acknowledge the source. Sorry for the oversight.

Our Secretary-Treasurer, Dr. Harvey Schmidt was honored with a NAWCC Fellow award, presented at the banquet following the recent regional in Orlando, Florida. Well deserved and long overdue... congratulations Harvey.

The REIFLER catalog material which appeared in issue #3 of 1996 is continued in this issue, with more to come in future journals. While most of us will never have the privilege of seeing one of these remarkable clocks, we can at least come close by enjoying the company's advertising copy and technical specs from their publications.

Additionally, Mel Kaye describes his recent troubleshooting experience with the use of some high-tech, labor saving(?) devices in the course of a repair to an AC operated clock. A very informative piece that will serve us all well... don't miss this one.

Good reading ahead...

Martin Swetsky, FNAWCC, President
Dr. Harvey Schmidt, FNAWCC..... Co-Editors
Dr. George Feinstein.....

HARVEY SCHMIDT, SECRETARY-TREASURER, 75-80 179th ST., FLUSHING, NY 11366

A Confession and a Warning to Others

Within the last few years a new type of electrical testing instrument has appeared on the market. It is a solid-state device, with a built in battery, that senses the presence of AC voltage, just by being placed in the proximity of the conductor or equipment being tested. Electrical contact is not necessary, as the device senses the electromagnetic flux field surrounding the AC conductor. It is a very clever, and very sensitive device, that incidentally makes one aware of the electromagnetic field that surrounds all AC conductors and devices, whether or not there is any current flowing. (The environmentalists are concerned about this, because higher voltages produce electromagnetic fields that extend for large distances.)

I was using one of these high-tech instruments to trouble-shoot an old advertising clock that has a Synchron AC motor. On my bench, the clock wouldn't work, despite the fact that this new testing device indicated that AC was present in the line cord, and in the motor itself. The motor wouldn't even hum. Obviously the motor was defective, right? I tore the clock apart, to get at the motor, hopefully to replace it..

The clock also contained a miniature light, to illuminate the advertising message. This didn't light either. While the clock was apart, I attempted to get this light working also. Changing the lamp bulb didn't do it. Must be the switch for the lamp, right? However, the new AC tester indicated that there was voltage through the switch, and to the lamp socket. I tested the lamp bulbs in another device that had the same sized miniature lamp socket. Both lamps were OK!

Suspicion of a bigger trouble began to dawn. I checked the checker. It seems that these new devices efficiently sense the presence of AC, but obviously do not indicate continuity of the circuit, or whether there is a break in the ground or neutral conductor.

The Confession:

I found that the problem was not in the clock, but on my work bench. I had a multiple tap extension device, that is complete with a disconnect switch and circuit breaker, connected by an extension cord to the household AC supply.

The wires on the extension cord were reversed. The switch on the multiple tap extension device somehow got turned off, and this had opened the ground, or neutral leg. The "hot" leg was still hot, and the new solid-state device was properly indicating that the circuit was energized. However, the break in the neutral leg was not evident, and that created the false picture of other problems.

An old fashioned simple test lamp, with its two test leads, would have prominently indicated that there was no electrical continuity, and would have prevented my tearing the clock apart..

Of course, this potentially dangerous situation on the bench was promptly corrected, by reversing one of the extension cord plugs.

But I still have this clock torn apart....

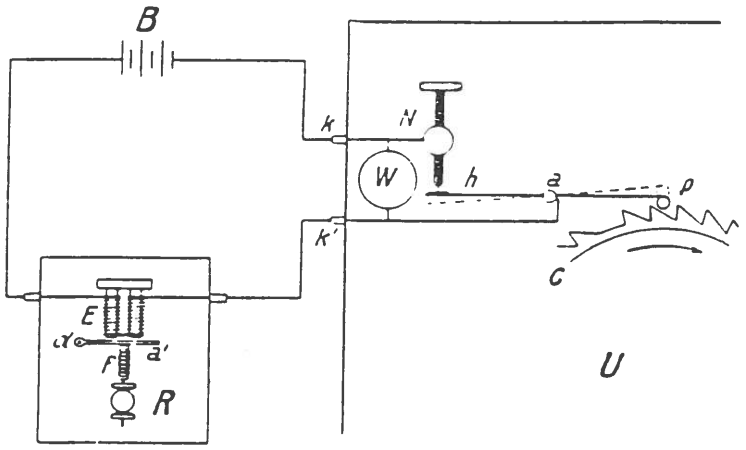
At least, this confession makes me feel better.

The Warning

The morals to the story, of course, are:
1. Check the polarity of your bench circuitry.
2. Be aware of the shortcoming in these new sophisticated "voltage sensing" testing devices. Just because they show an AC voltage present, doesn't mean that there is a complete operating circuit.

Mel Kaye
#54804

II. Electric contacts, arrangements for synchronizing and regulating electrically clocks at a distance.



No. 111.

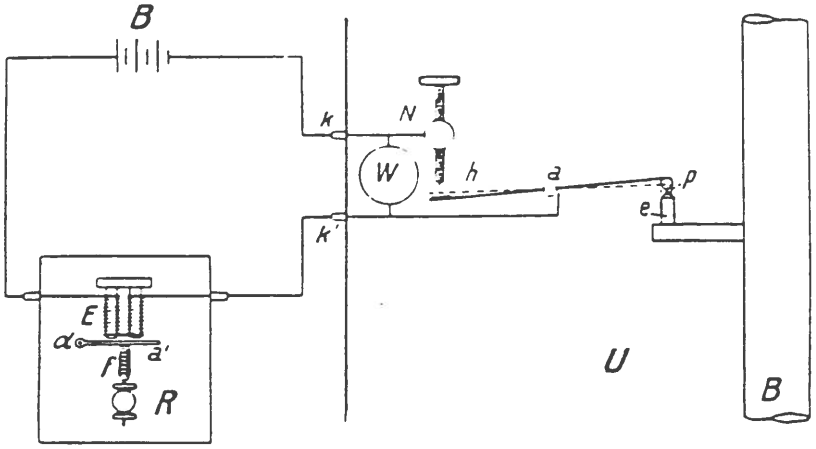
No. 111. Electric seconds-contact (wheel contact) **for continuous current.**

There are three kinds of electric seconds-contacts for continuous current:

1. The intermittent contact, contact-wheel with 30 or 29 teeth,
2. the one second contact, contact-wheel with 60 or 59 teeth,
3. the two seconds contact, contact-wheel with 30 or 29 teeth.

The markings, which these contacts produce on the paper band wound on the cylinder of the chronograph, are illustrated on page 5 in the chapter: "Remarks for ordering and despatching the clocks, pendulums etc." . . . . . **Price**

In the quotation of prices for the clocks D, B, A and A¹ the electric seconds-contact is included.



No. 112.

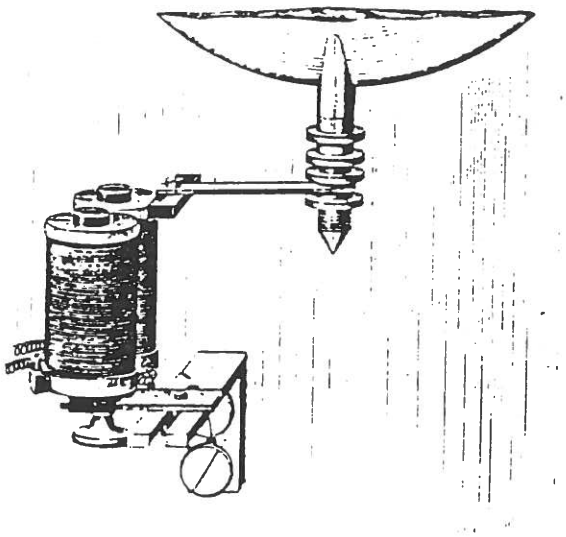
No. 112. Electric pendulum-contact for precision-pendulum clocks to be used with the coincidence-apparatus for measuring the value of "g" (gravity) . . . . . **Price**

This contact is included in the price stated for the clock No. 107.

No. 113. Electric seconds-contact for alternating current (wheel contact). For working the seconds dials No. 108 Type F, the corresponding standard clock must be provided with this contact.

Price

No. 114. Electric contact for alternating current for working half-minutes dials . . . . . **Price**

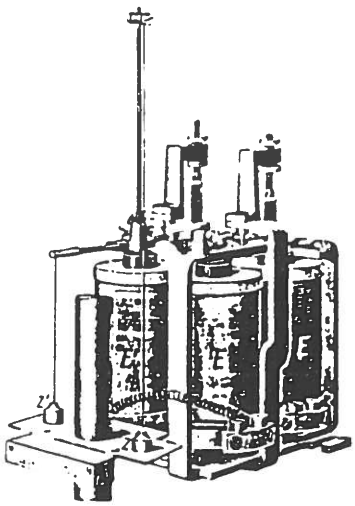


No. 115.

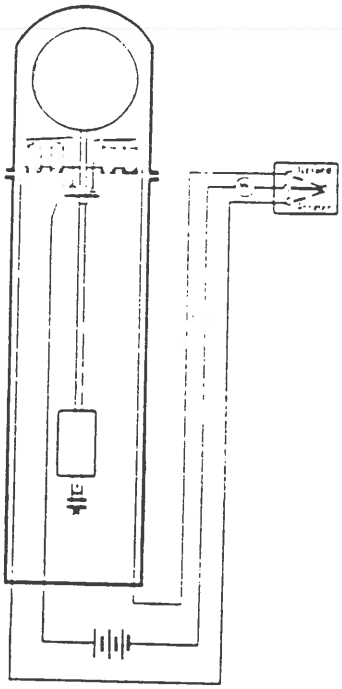
Nr. 115. Synchronizing-arrangement for secondary clocks consisting of the electro-magnet, the pallet-frame with the pallet to be fixed on the pendulum, and the armature, by which the electro-magnet is adjustable in every direction, to be fixed on the clock-case

Price

The price stated for the clock No. 106 includes the synchronizing arrangement.



No. 116. ½ size.



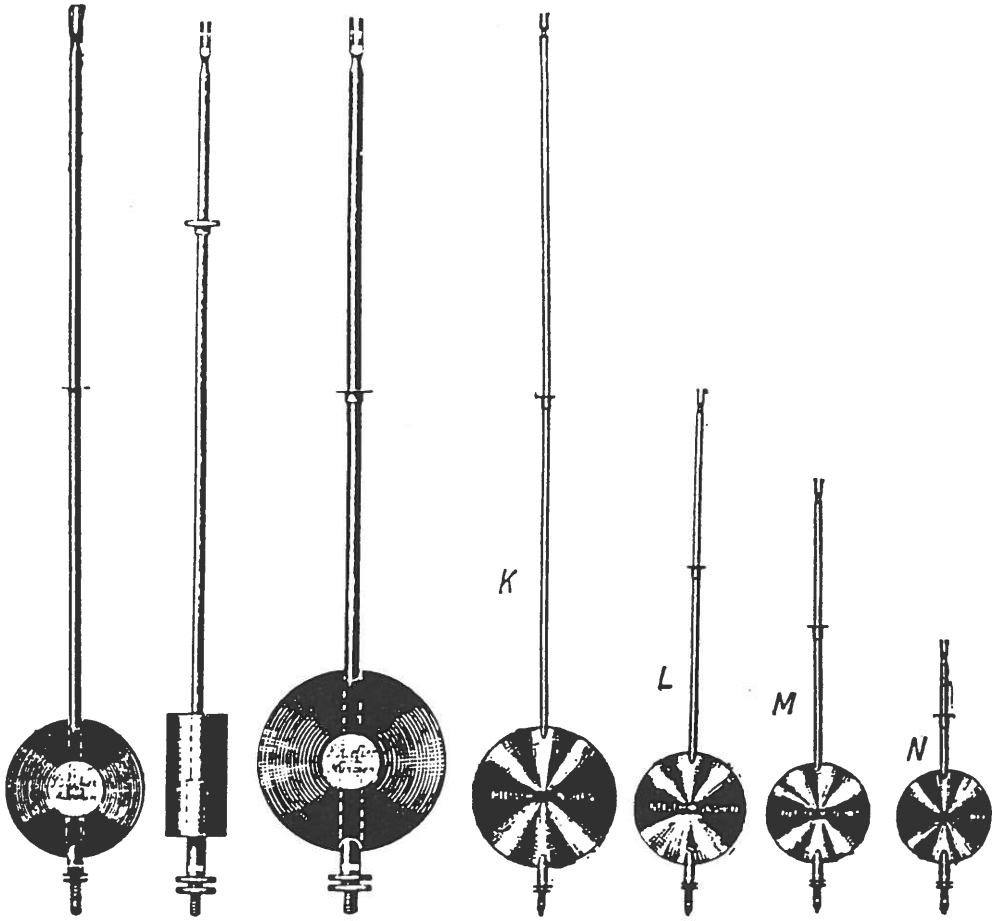
Arrangement of circuits.

No. 116. Arrangement for regulating electrically a clock at a distance, consisting of two electro-magnets EE¹ placed on one sole plate, to each pallet of which is fixed an additional weight Z and Z¹ hanging on a silk thread, and a tray-plate, on which the small weights rest when the electro-magnets are excited, the tray being fixed to the pendulum near the swinging-scale, together with a handle switch No. 160 (see arrangement of circuits).

The sole plate with the electro-magnet can be screwed to the work-frame of clock D . . . . . **Price**

III. Nickel-steel compensation pendulums.

D. R. P. No. 100870.



No. 121 Type J. | No. 122 Type J¹. | No. 123 Type J². | No. 124 Type K. | No. 125 Type L. | No. 126 Type M. | No. 127 Type N.

¹/₁₀ size.

No. 121 Type J. Nickel-steel compensation pendulum of first class with the pendulum rod 14 mm thick for delicate seconds-pendulum clocks in dust-tight case. The bob is made of brass and is nickel-plated.

Price

No. 122 Type J¹. Nickel-steel compensation pendulum of first class with the pendulum rod 14 mm thick for delicate seconds-pendulum clocks in air-tight glass case. The cylindrical bob is made of brass and is gilded . . . . . **Price**

No. 123 Type J². Nickel-steel compensation pendulum of second class with the pendulum rod 14 mm thick for tower clocks. The bob is made of cast-iron and is nickel-plated . . . . . **Price**

No. 124 Type K. Nickel-steel compensation pendulum of second class with the pendulum rod 10 mm thick for seconds-pendulum clocks. The bob is made of brass and is nickel-plated . **Price**

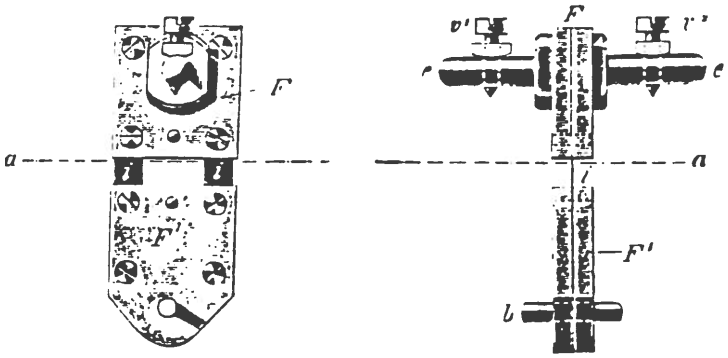
No. 125 Type L. Nickel-steel compensation pendulum of second class for regulators with 80 swings per minute. The bob is made of brass and is nickel-plated . . . . . **Price**

No. 126 Type M. The same for regulators with 90 swings per minute. The bob is made of brass and is nickel-plated . . **Price**

No. 127 Type N. The same for half-seconds pendulum clocks. The bob is made of brass and is nickel-plated . . . . . **Price**

There can also be furnished nickel-steel compensation pendulums with other times of oscillations than those mentioned above.

IV. Pendulum suspensions, suspension brackets and pendulum crutches.

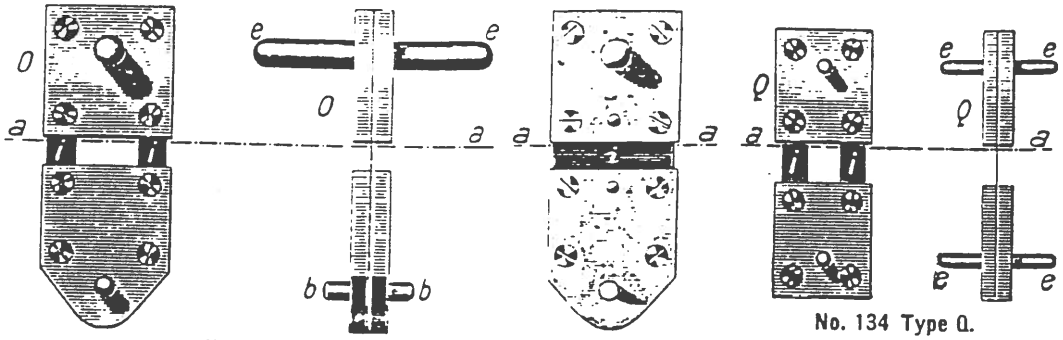


No. 131. ⅓ full size.

No. 131. Pendulum suspension of steel, with adjusting screws on axis, for clocks with my free escapement . . . . . **Price**

9

Parts of pendulum suspensions for clocks which are not provided with my free escapement.



No. 132 Type O. full size.

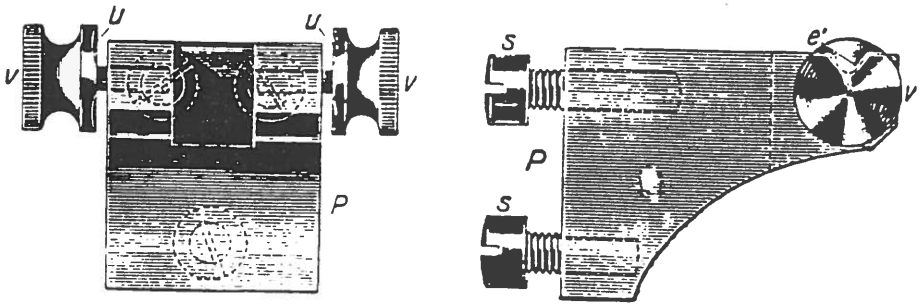
No. 133 Type O'. full size.

No. 134 Type Q. full size.

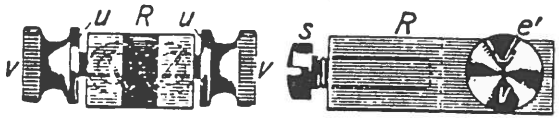
No. 132 Type O. Pendulum suspension of steel for seconds pendulums with the pendulum rod 14 and 10 mm thick . . . **Price**

No. 133 Type O'. Pendulum suspension of steel for tower clock pendulums. **Price**

No. 134 Type Q. Pendulum suspension for pendulums with 80 swings, 90 swings and half-seconds pendulums . . . . . **Price**



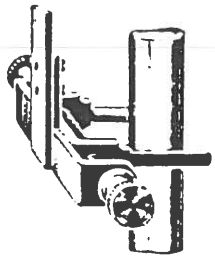
No. 135 Type P. full size.



No. 136 Type R. full size.

No. 135 Type P. Suspension bracket of brass, nickel-plated, for seconds pendulums . . . . . **Price**

No. 136 Type R. Suspension bracket of brass, lacquered, for pendulums with 80 swings, 90 swings and half-seconds pendulums. **Price**



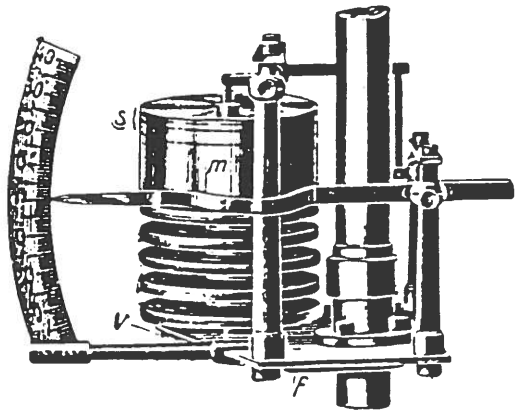
No. 137 Type S¹.
⅘ size.

No. 138 Type S.
full size.

No. 137 Type S¹. Pendulum crutch of brass with micrometer-screw, to be screwed at the pallet-arm for pendulums with a rod 10 or 14 mm thick . . . . . **Price**

No. 138 Type S. Pendulum crutch of brass for pendulums with a rod 10 or 14 mm thick . . . . . **Price**

V. Air-pressure compensation of pendulum.

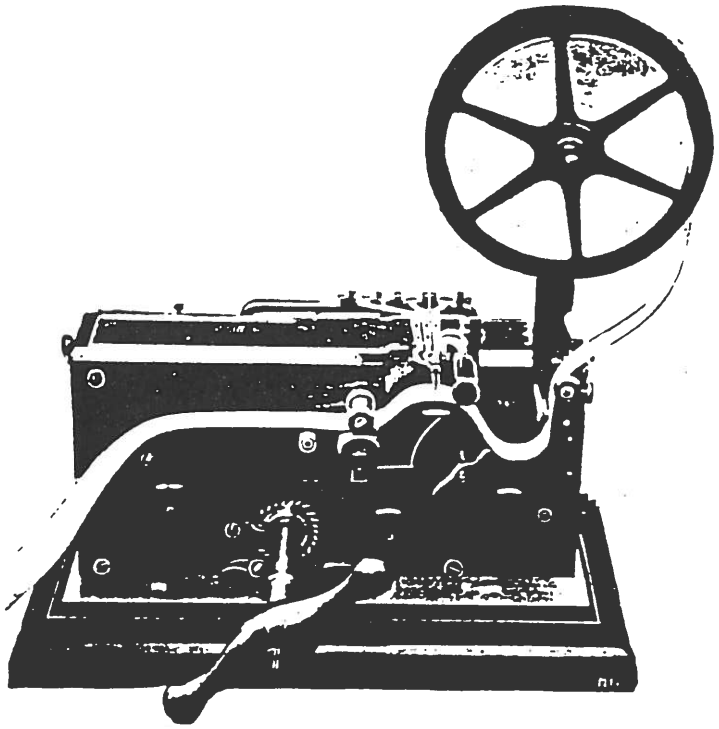


No. 141. ½ size.

No. 141. Air-pressure compensation of the pendulum to be applied to a nickel-steel pendulum Type J for a clock Type B **Price**

The price stated for the clock Type B includes that of the air-pressure compensation.

VI. Apparatus for registration, for conduction and measuring of current.



No. 145. ¼ size.

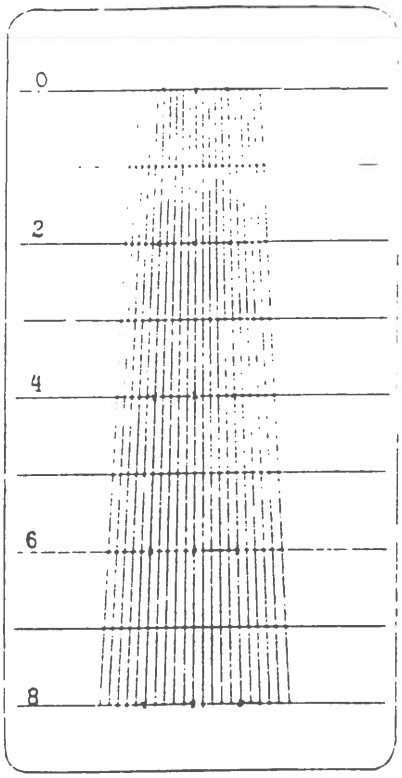
No. 145. Chronograph with paper band and writing levers (colour-writers) „System Hipp" with two electro-magnets and weight driven wheel work; the second is 10 or 15 mm long . . . . **Price**

No. 146. Paper band, per roll . . . . . .

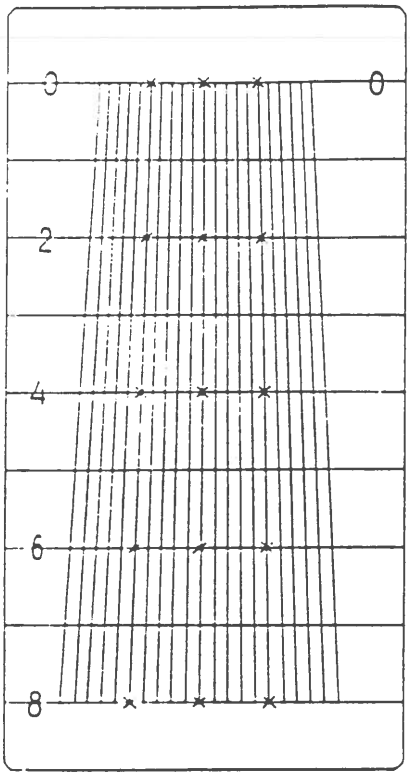
No. 147. Ink for chronograph, small bottle . . . . . .

No. 148a. Reading-scale "System Fuess" of transparent celluloid with converging lines; the second is 10 mm long . . . **Price**

No. 148b. The same with the second 15 mm long . . **Price**

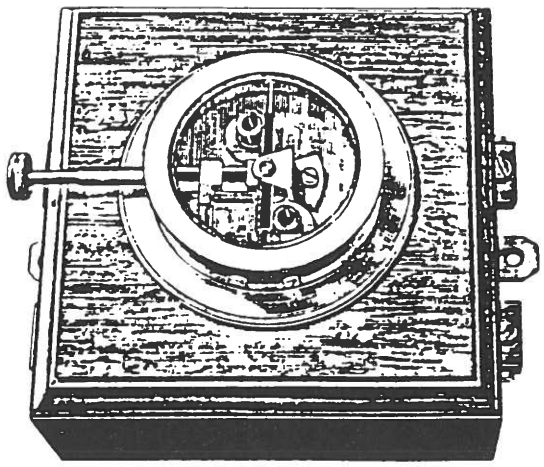


No. 148 a. full size.

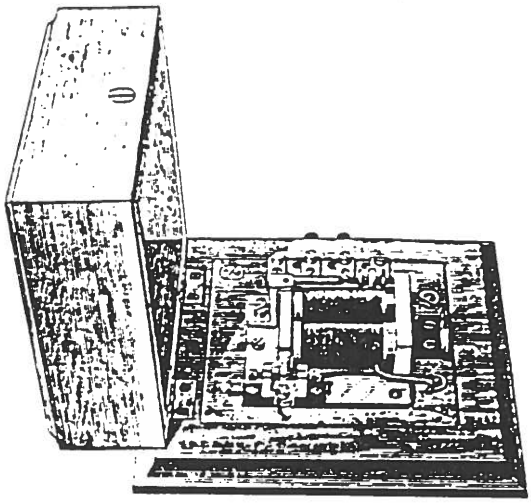


No. 148 b. full size.

No. 149. Box-relay to be used in connection with the chronograph; the second circuit is adjustable for intermittent current as well as for continuous current: the anchor axis turns in jewelled holes; it works well with a strength of current of 1 to 2 Milli-Ampère; the resistance of the coils is usually 50 ohms . . . . **Price**



No. 149. 1/3 size.

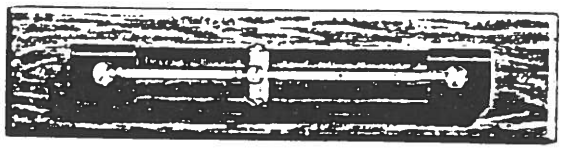


No. 150. 1/3 size.

No. 150. Seconds-sounder (sounding relay) for making the pendulum beats of the observing clock audible, to be used when observing by the eye-and-ear method . . . . . **Price**

No. 151. 1/3 size.

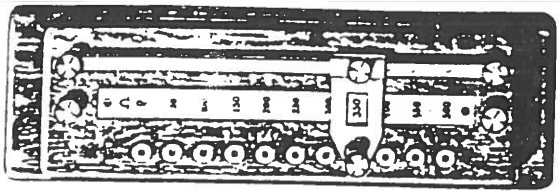
No. 151. Resistance coils used as constant resistances and as spark preventive coils, made of bifilar-wound constantan wire with double silk insulation. Coils with the following resistances are in stock: 50, 500, 1000, 1500, 2000 and 2500 ohms . . . **Price per coil**



No. 152. 1/4 size.

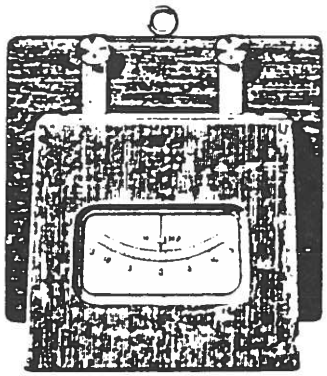
No. 152. Sliding rheostat adjustable to any resistance between 0 and 50 ohms, made of bright constantan wire wound on an insulating core provided with thread grooves. The maximum current is 0,3 Ampère **Price**

No. 153. Coil rheostat adjustable to resistances of 50, 100, 150 etc. to 500 ohms, consisting of 10 resistance coils of 50 ohms each, which are contained in a small mahogany case. In the case is room for an

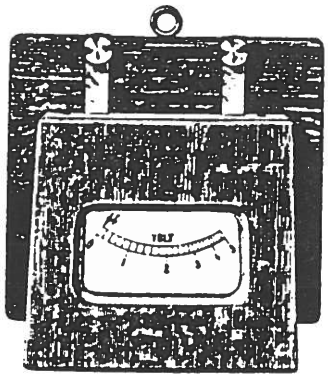


No. 153. 1/3 size.

additional coil. If, for instance, an additional coil of 500 ohms is used, resistances of 500, 550, 600 etc. to 1000 ohms can be put into the circuit. The maximum current is 0,2 Ampère. **Price**



No. 154. 1/3 size.



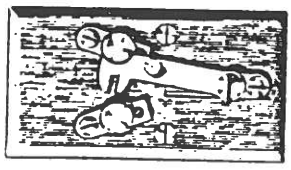
No. 156. 1/3 size.

No. 154. Dead-beat Milli-Ampèremeter after Deprez-d'Arsonval, measuring 0—15 Milli-Ampère, with the zero-point in the middle of the scale . . . . . **Price**

No. 155. The same, measuring 0—100 Milli-Ampère, with the zero-point of the scale at the side . . . . . **Price**

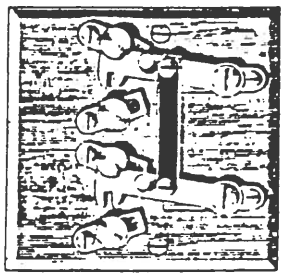
No. 156. Dead-beat Voltmeter after Deprez-d'Arsonval, measuring 0—5 Volts, with the zero-point of the scale at the side. **Price**

No. 157. The same, measuring 0—10 volts, with the zero-point of the scale at the side . . . . . **Price**

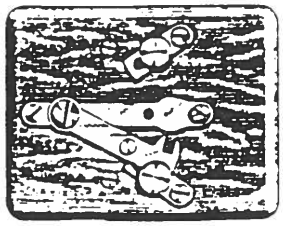


No. 158. 1/3 size.

No. 158. Handle switch for two ways . . . . . **Price**



No. 159. 1/3 size.



No. 160. 1/3 size.

No. 159. Double switch for two circuits . . . . . **Price**

No. 160. Handle switch for three ways . . . . . **Price**

The connecting lever of the switches No. 158 and No. 160 can be fixed in every position and that of No. 159 in the external positions by a binding screw that ensures a very good contact. The nickel-plated brass parts of the switches are mounted on small polished mahogany boards.

No. 161. Dry element (of the best system) 8 × 8 × 16 cm, potential 1,4—1,5 Volts . . . . . **Price**

No. 162. Accumulator battery, potential 4 volts, consisting of two cells with lead plates, in a wooden case . . . . . **Price**

The accumulators are supplied without being filled with sulphuric acid. For filling one cell, about 0,2 litres of concentrated sulphuric acid (specific gravity = 1.18), are required. Instructions for the first charging of the accumulators are contained in the pamphlet: "Präzisions-Pendeluhren und Zeitdienst-Anlagen für Sternwarten" von Dr. S. Riefler, München. Th. Ackermann 1907.

No. 163. full size.

No. 164. full size.

No. 163. Connection binders, nickel-plated . **Price per piece**

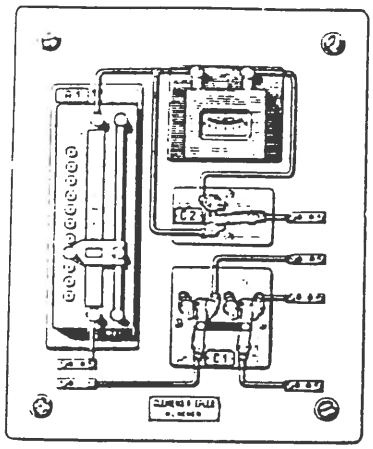
No. 164. The same, nickel-plated, to be screwed on wooden boards **Price per piece**

No. 165. Insulated copper wire (diameter = 0,9 mm), 100 metres (about 1,1 kilos) . . . . . **Price**

No. 166. The same (diameter = 1,5 mm) 100 metres . **Price**

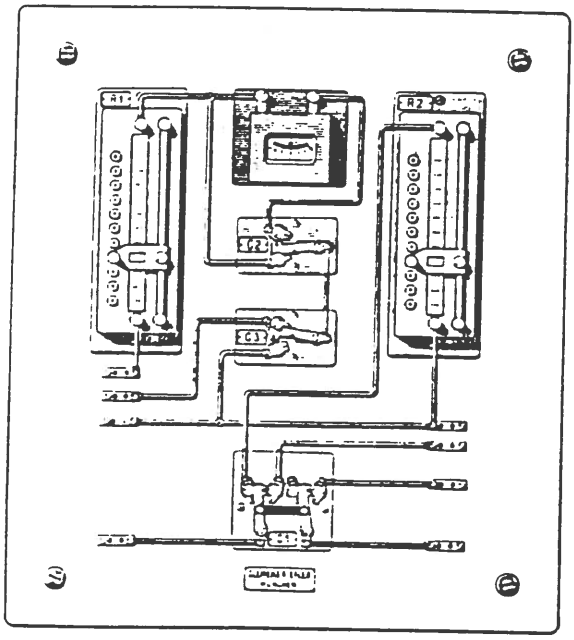
No. 167. Conduction cable with two insulated wires, one metre **Price**

VII. Standard switch-boards for time-service installations.



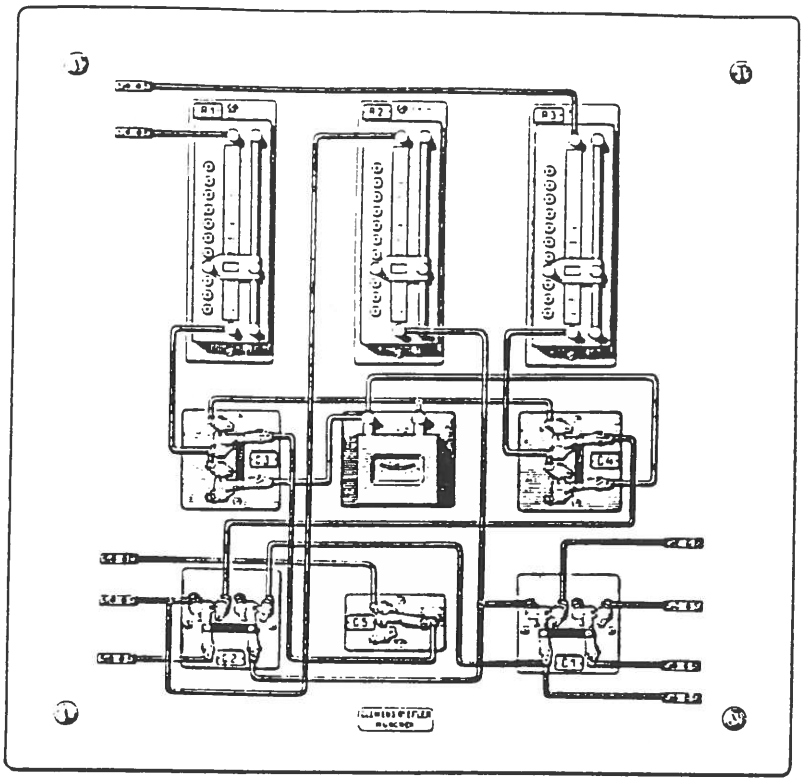
No. 171. Switch-board I. 1/10 size.

No. 171. Switch-board I with rheostat, Milli-Ampèremeter and two switches for an installation consisting of a Standard clock, rheostat and relay . . . . . **Price**



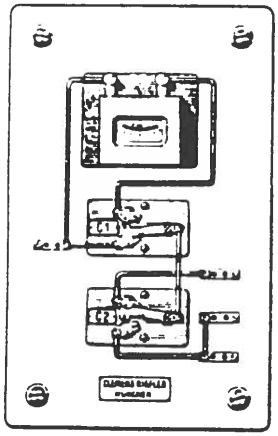
No. 172. Switch-board II. 1/10 size.

No. 172. Switch-board II with two rheostats, one Milli-Ampèremeter and three switches for an installation consisting of one Standard-clock, used as registering clock, of one or more secondary clocks synchronized by the Standard clock, and of chronograph and relay . . . . . **Price**



No. 173. Switch-board III. 1/10 size.

No. 173. Switch-board III with three rheostats, one Milli-Ampèremeter and five switches for an installation consisting of one Standard clock with one or more secondary clocks synchronized by the former; the Standard clock as well as one of the secondary clocks to be used as registering clock for one or more chronographs **Price**

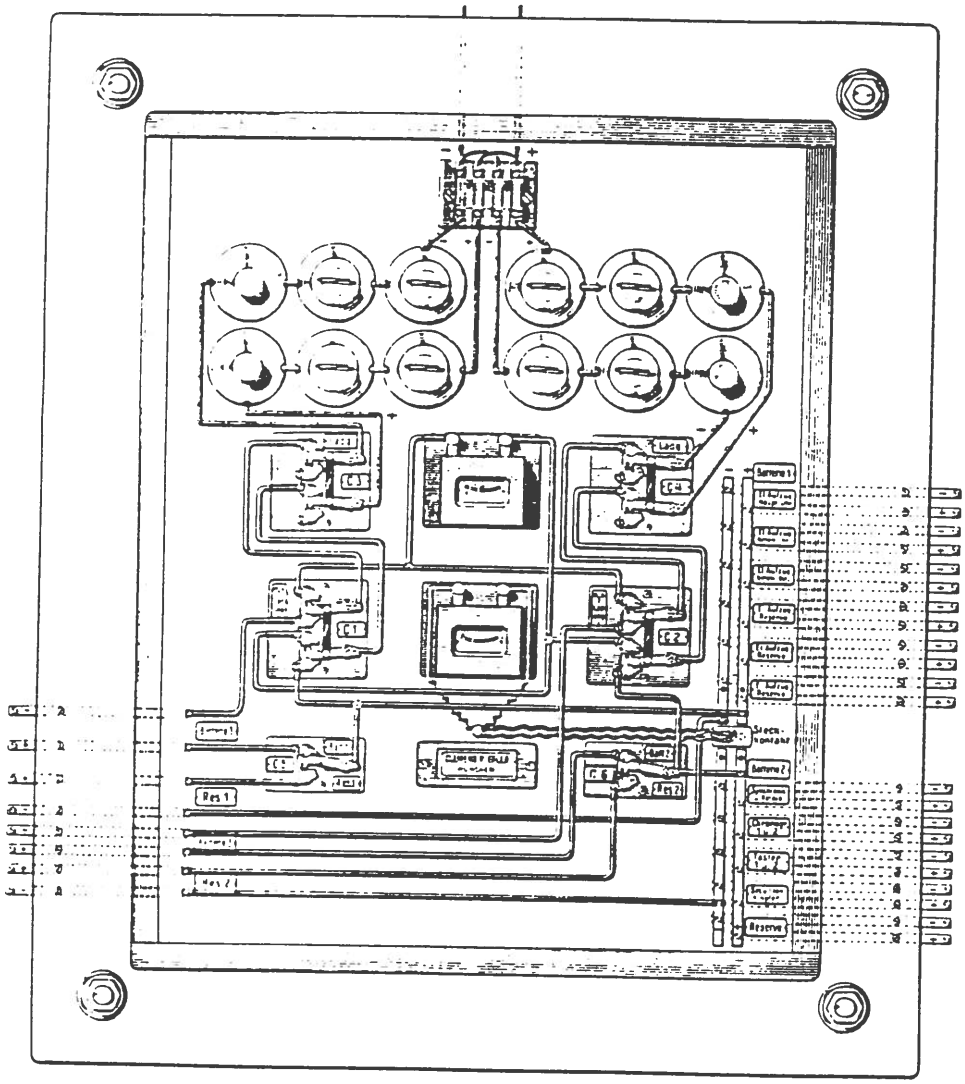


No. 174. Switch-board IV. 1/10 size.

No. 174. Switch-board IV with Milli-Ampèremeter and two switches for an installation with a number of synchronized secondary

clocks, of which one secondary clock has a switch-board with rheostat, that is. II, III or VIII, while each of the other secondary clocks has the switch-board IV, the Milli-Ampèremeter of which serves as a control showing if the indication of the hand of the secondary clock corresponds to that of the Standard clock

Price



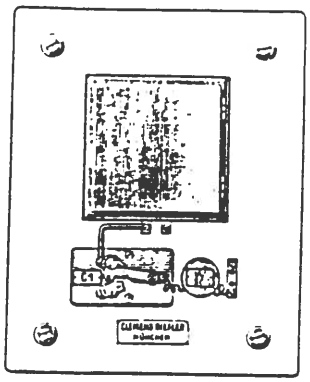
No. 175. Switch-board V. 1/10 size.

No. 175. Switch-board V of marble for larger time-service installations with arrangements for continuous charging of the accumulators by joining them to leads giving either 110 or 220 volts. The board contains safety fuses, glow-lamp resistances, Milli-Ampère-

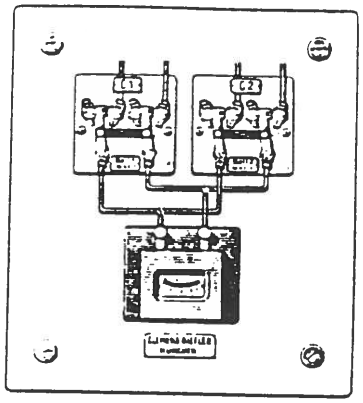
meter, Voltmeter, six switches and plug-switch for measuring the potential at the terminal bars of the two batteries

Price

A protecting case of mahogany with glass door and lock, to be screwed on the marble-plate, increases the price of the switch-board by . . . . . .



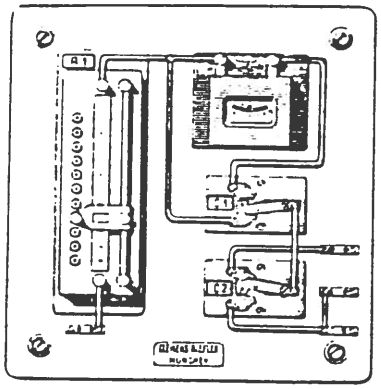
No. 176. Switch-board VI. 1/10 size.



No. 177. Switch-board VII. 1/10 size.

No. 176. Switch-board VI with seconds-sounder, resistance coil and switch **Price**

No. 177. Switch-board VII with Voltmeter and two double switches for measuring the potential of two batteries . . . . **Price**



No. 178. Switch-board VIII. 1/10 size.

No. 178. Switch-board VIII with rheostat, Milli-Ampèremeter and two switches for an installation consisting of one Standard clock and one or more synchronized secondary clocks . . . **Price**

If there are more secondary clocks, only one of them has the switch-board VIII and each of the other clocks the switch-board IV.

— MART —

All MART Ads are FREE, Send copy to the attention of the Editor:
Harvey Schmidt, 75-80 179th St., Flushing, NY 11366. Limit 3 lines.

WANTED: **HOROLOGICAL LITERATURE**, Repair info, Catalogs, etc. for the Journal **PORTESCAP** Secticon Clock or Movement. Antique Watch & Clockmaker's Tools & Machinery. (718) 969-0847 Harvey Schmidt, 75-80 179th St., Flushing, NY 11366

SESSIONS Synchronous Motor for WM Chime Clocks of mid 1930's. **JEFFERSON GOLDEN HELM** Synchronous Motor **REMPE** 80 beat movement for #44 case. Or will sell/trade case. Len Brenner. 1127 Towne Lake Dr., Longview TX 75601, (903) 233-3222, brennerl@letu.edu

STANDARD ELECTRIC "Eye Brow style case" for 60 beat movement, 65"x22¾"x9¾". Two battery holders (D cell) for the battery operated Cuckoo clocks made around 1972 **REGULA** movement by Schmeckenbecher. Don Mills, P.O. Box 124, Bonner Springs KS 66012 (913) 422-5014

ELECTRO-MECHANICAL Clocks: One or a Collection, Any Condition. Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230 (800)221-0424 X206

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BRILLIE, Type 1578, 1592, 1595, and 1598. Complete, Repairable, Price, Condition. Kenneth Erlenbusch, 124 North Avena Avenue, Lodi, CA 95240 Nights (209) 369-5833

SWCC Dial and 2 lb. Bob w/ Wooden Pendulum Rod. **TIFFANY** 4-3/8" Dial w/ "Tiffany Neverwind" on dial. Roy Crowe, 9257 Appleby Street, Downey, CA 90240 (310) 861-8788

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SWCC Western Union, 15-1/2" convex "glass". Actually it is plastic, but it beats a naked dial. $20.00 (I'll pay UPS up to $5.00) Paul M. Hopkins, 2717 Millwood Rd., Birmingham, AL 35243 (205) 967-1237

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Requests for reprints of previously published material should be directed to the Chapter Historian:
Dr. George Feinstein 75-19 195th Street Flushing, NY 11366

This message received by one of our members on the internet...

It illustrates the degree that the net is being used these days, and the question was raised about the Electrical Horology Society's participation.

The editorial staff is interested in your comments in this regard, and if any member is willing to take on the job of managing this phase of our involvement?

Please let us hear from you... your comments will be appreciated.

To: [unknown], INTERNET:CLOCKSMITHS@WEBCOM.COM
From: INTERNET:CHANEYAB@aol.com, INTERNET:CHANEYAB@aol.com
Date: 3/10/97, 10:18 AM
Re: Favag master clock

Sender: clockerrs@webcom.com
Received: from e55.webcom.com (e55.webcom.com [209.1.28.85]) by hil-img-6.compuserve.
id JAA28685; Mon, 10 Mar 1997 09:43:26 -0500
Received: from localhost (ultra2.webcom.com) by e55.webcom.com with SMTP
(1.37.109.15/16.2) id AA015645109; Mon, 10 Mar 1997 06:45:09 -0800
Date: Mon, 10 Mar 1997 06:45:09 -0800
From: CHANEYAB@aol.com
Message-Id: <970310094013_1714368670@emout13.mail.aol.com>
To: clocksmiths@webcom.com
Subject: Favag master clock

I purchased a clock in Switzerland about 5 years ago, and am looking for some info on it. It was made by the Favag Co. of Neuchatel, where I was in watchmaking school, but I didn't get to research it there.

The clock is a 2/3 seconds beating, Invar pend. with cylindrical bob, Hipp toggle type of electric. It plugs into the wall (and works admirally even on 110v.) and there is an electronic circut that tricle charges 4 gell cell batteries of 6v each, wired in series.

The secondary dial has a reversing pole stepping motor, energised once per minute.

The case is oak(?) and the backplate is steel. I have some instructions for its operation, in french, which I speak some of, but I would like more info as to the company, others who might have a similar clock, sources for more secondary mvmts. etc.

Btw, it dates to about 1939 and though I probably don't need to mention it, the clock keeps wonderful time.

Thanks, Bob Chaney

THE JOURNAL OF THE ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78
NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

VOLUME XXIII #2, JUNE 1997

Fellow Horologists:

This issue continues with the REIFLER series and is quite likely one of the more interesting since it covers his escapement, suspension, and pendulum compensation with drawings and explanations as they appeared in his patent applications. While most of us will never have the privilege of examining one of these clocks first-hand, Reifler's fame stemmed from his method of temperature compensation and suspension construction which are covered in detail herein

In addition, we include a reprint of the SYNCHRONOME literature of 1905, in which their Time Service and clock offerings are described, as offered for the Australian market. Of special interest, is the escape wheel and anchor escape ment employed which preceded the count wheel and waiting train seen in the final production versions. Our thanks to Professor Norman Heckenberg of the University of Queensland in Brisbane, Australia for this material.

While we are on the subject of offering thanks for literature contributions, we are compelled to request greater participation in this area. We produce our journal with the material made available to us... when it occasionally appears less interesting or a bit on the stale side, bear in mind that we work with what we have! If anyone has some information to offer; literature reprints, helpful hints or interesting repair experiences, send it in, and don't be afraid of the grammar or composition... we'll fix it up. Also on the subject of journal composition... we'd like to hear from you with your suggestions as well as criticisms. (SEE PAGE 14)

The video of the outstanding Electrical Horology exhibit presented at the Eastern States Regional last August by Chapter 78 members is "almost" ready for distribution. We were promised a few copies which will be used to lend to those members that were not in attendance and could not see the display for themselves. An interesting demonstration of the results of teamwork and cooperation.

Enjoy this issue... good reading ahead.

Martin Swetsky, FNAWCC, President
Dr. Harvey Schmidt, FNAWCC
Dr. George Feinstein
} Co-Editors

HARVEY SCHMIDT, SECRETARY-TREASURER, 75-80 179th ST., FLUSHING, NY 11366

Date of Application, 23rd Apr., 1889
Specification Accepted, 1st June, 1889

A.D. 1889, 23rd APRIL. N° 6809.

COMPLETE SPECIFICATION.

Improvements in Balance Wheel Escapements for Watches or Clocks.

I, SIGMUND RIEFLER, Engineer and Manufacturer of Munich in the Empire of Germany do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

In all balance wheel escapements for watches or clocks known hitherto, the transmission of power from the wheel train to the balance has been effected by the last wheel of the train, the escapement wheel giving impulsions to a lever the fulcrum of which is in the axis of the balance, either directly, or indirectly through an intermediate lever; the chronometer escapement, duplex and verge escapements are examples of the direct action the impulse pallets being the levers aforesaid. The lever escapement is an example of the indirect action.

The improved escapement hereinafter described and claimed differs in principle from the above. As the balance wheel moves or oscillates from its resting position the spiral spring or recoil spring is brought into tension, the tension increasing with the amplitude of oscillation—If this tension is augmented at the suitable moment a supply of power results—The present invention consists therefore, in not having the end of the recoil spring fixed and stationary as heretofore, but making the same movable and under control of the wheel train in such a manner that the impulsions given by the wheel train are devoted to the moving back and forth at the proper moment of the fixing point of the recoil spring.

This effect may be obtained in different ways, but the preferred method of carrying the invention into practice is that illustrated in the accompanying drawings and hereinafter explained—Fig. 1 *a* being an elevation of the improved escapement Fig. 1 *b* a partly broken plan view thereof Figs. 2, 3 and 4 detail views thereof modified in construction the latter two views being on a larger scale. Figs. 5 and 6 illustrate a modification in the escapement.

Below the balance arbor *a* and in extension of the axis thereof is freely pivoted the three-armed wheel B, one arm of which carries a pillar K to which the end of the recoil spring P of the balance is fixed, and the other two arms are respectively provided

with the impulse and detent pallets S, S^1 which may be cylindrical pillars projecting above the level of the wheel B and having their upper portions cut away to be flat upon one side. The cylindrical lower part of each acts as impulse pallet, the plane upper part as detent. On the arbor *e f* of the wheel train is the escapement wheel R H, which in Fig. 1 is formed of two superposed wheels R and H, the lower wheel being the impulse wheel, the upper wheel the detent wheel—The under wheel H is cut with inclined teeth $h\ h^1\ h^2$ *etc.*, the upper wheel R with teeth $r\ r^1\ r^2$ *etc.* with radial faces or faces even slightly undercut.

This escapement operates as follows ;—When the balance wheel U moves from rest in the direction of the arrow, the recoil spring carries the wheel B in the same direction until the pallet S^1 arrives against the inclined face of the tooth *h* of the wheel H. At this moment the pallet S leaves the point r^2 of the wheel R, the escapement wheel then turn in the direction of the arrow and the inclined face of the tooth *h* presses back the pallet S^1 thus increasing the tension of the recoil spring—The balance in returning will by reason of this augmentation of the tension of the recoil spring swing with equal amplitude and at the moment when the wheel passes the position of rest, the recoil spring being brought into contrary tension will move the wheel B in the contrary direction, cause the pallet S to arrive on the inclined tooth h^2, and the pallet S^1 to leave the detent tooth *r*, thus permitting the escapement wheel to revolve and augment the tension of the recoil spring by lifting the pallet S—Besides the two wheels R and H a third wheel E is fixed on the arbor *e* ; this wheel E moves a flying pinion W in the usual way, so that the escapement operates without shock and the escapement teeth touch the pallets very softly—The resistance to disengagement may be adjusted by turning the pallets S and S^1 correspondingly in their sockets—The resistance may be reduced to zero without fear of untimely disengagement since the recoil spring always presses the pallets against the escapement wheel with its periodical tension.

Instead of two separate wheels R and H of course, a single wheel may be used with its lift and detent teeth on different levels as shown by the cross section of part of such a wheel in Fig. 2—Or for some purposes, for instance for travelling clocks and the like, one wheel only may be used, with both lift and detent teeth on the same level. the pallets being then either cylindrical along their whole length, or else cut down on one side to a plane surface at a depth of about a fifth part of their diameter, so that the resistance of disengagement may be regulated, as in Figs. 3 and 4 respectively.

In place of having cylindrical fixed pallets small rollers may be used for the impulse pallets, and in such case it is preferably to make the detent pallets independent of the impulse rollers, placing the detent pallets closer together or inside the distance of the impulse rollers.

Satisfactory results may also be obtained by the arrangement shown in Figs. 5 and 6. The two pallets S S^1 on the wheel B are here only detent pallets, against which lies the escapement tooth R^1. The impulse is not effected by a wheel but by an excentric or untrue rotary body, for instance a crank wrist or excentric disc, on the arbor *e f* of the wheel train, said body engaging in the fork *g*. securely fixed on the arbor of the wheel B.

The operation of this escapement is as follows ; When the balance wheel moves from rest in the direction of the arrow, the nearer limb of the fork touches the excentric, this movement also frees the pallet S and the escapement tooth R^1, and the escapement is free to turn, until the tooth arrives on the pallet S^1, the rotation of the arbor *e f* moves the fork *g* and so supplies the impetus to the recoil spring—With this construction of escapement also, a flying pinion W is preferably used.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is ;—

In horological escapements with balance and recoil spring ;

1. The method of transmitting power from the wheel train to the balance by means of or through the recoil spring.

2. The combination of the balance, the recoil spring fixed thereto in the usual manner, a pivoted wheel or equivalent B fixed to the end of said recoil spring substantially as set forth, and adapted to be oscillated by the wheel train.

3. The combination of the double escapement wheel R H having detent teeth *r r*¹ *etc.* and impulse teeth *h h*¹ *etc.*, or the equivalent thereof, a single wheel with said teeth; with two pallets S and S¹, each being both impulse and detent pallets, and a pivoted anchor B for said pallets, whereby an oscillating movement may be given by the wheel train to the anchor B substantially as set forth, the detent tooth being beyond the radius of the impulse tooth.

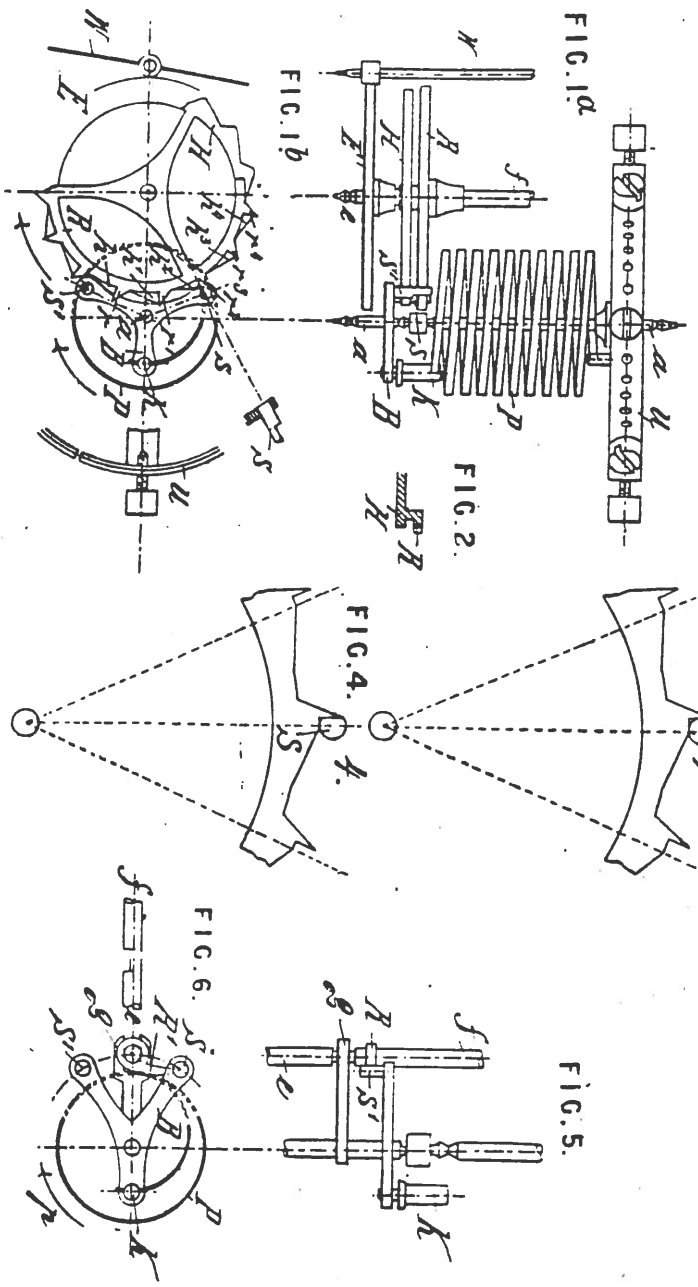
4. The combination with the recoil spring of the anchor or wheel B fastened thereto detent pallets S S¹ on said anchor, fork *g* and arbour *e f* with crank wrist or equivalent and detent tooth R¹, substantially as and for the purpose set forth.

Dated this 23rd day of April 1889.

HERBERT & Co.,
18, Buckingham Street, Strand, W.C.,
Agents to Applicant.

LONDON: Printed for Her Majesty's Stationery Office,
By DARLING AND SON, LTD.

1889.



[This Drawing is a reproduction of the Original on a reduced scale.]

London: Printed by DARLING and SON Ltd.
for Her Majesty's Stationery Office. 1889.

Malby & Sons, Photo-Litho.

N° 14,259 A.D. 1891

Date of Application, 24th Aug., 1891—Accepted, 31st Oct., 1891

COMPLETE SPECIFICATION.

An Improved Mercurial Compensation Pendulum for Pendulum Clocks of all kinds.

I, SIGMUND RIEFLER, of 29, Karlsplatz, Munic, in the Kingdom of Bavaria, German Empire, Engineer and Manufacturer do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

My invention relates to pendulums known by the name of mercurial-compensation-pendulums and the object is to increase the compensating effect to the utmost accuracy.

This object I attain by collecting the mercury merely in the hollow of the pendulum rod.

Referring to the drawing herewith

The rod *a* is a straight tube made of any suitable material preferably of steel. The same is filled up with quicksilver. The height of the column of mercury is dependent on the weight of the pendulum-bob *b*, on the inner width of the tube *a* and also on its weight. The effect the mercury takes upon the pendulum by the change of temperature is evident. By the fall of the same the quicksilver shrinks together, thus causing the centre of gravity to lower, at the same time also the tube shrinks in its length, thus raising the pendulum-bob *b* and with it the centre of gravity, again when the temperature rises, the effect will be reversed to the first, that is to say, the mercury expands and thus raises its centre of gravity, while by the expansion of the tubular rod *a* the centre of gravity of the pendulum-bob *b* lowers. By these means an exact compensation is obtained. The amount of quicksilver to be used for each pendulum may be carefully calculated, when the same is to be filled, and since the compensating effect not only is dependent of height and weight of the mercury-column, but also of the weight of the complete matter, the latter may be increased or decreased for sake of regulation, without altering the amount of quicksilver employed. I will now point out the great advantages my new pendulum has in comparison to other mercurial-compensation-pendulums.

Firstly the compensation not only will be an exact one, when the temperature changes slowly, but also will be as true, when sudden variations of temperature take place. The reason thereof is this : the quantity of quicksilver is distributed about almost the whole length of the rod, and the same having also close contact therewith, will partake of the change of temperature almost as soon as the rod itself does, and therefore the expansion or contraction of the rod and of the mercury will nearly take place at the same time. In other mercurial-compensation-pendulums the quicksilver is collected in a vessel at the lower end.

Secondly also differences in the temperature of the air at different parts of the pendulum rod, will not only influence the rod, but also the mercury and therefore have no disturbing effect in the compensation. Moreover the pendulum may be made of any suitable shape as for instance that of a flat disk with sharp edges, or may be slightly curved like a double concave lens, thereby the air is easily cut, and little resistance is offered to the same. Finally the pendulum will be much cheaper, than others, since the amount of quicksilver required will be only one quarter of that used heretofore.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is :—

1. In a compensation-pendulum for clocks a pendulum rod filled with mercury, as for the purpose set forth.

[*Price* 6*d.*]

N° 14,259.—A.D. 1891.

Riefler's Improved Mercurial Compensation Pendulum for Pendulum Clocks of all kinds.

2. In a compensation-pendulum for clocks a pendulum-rod filled with mercury in combination with an ordinary pendulum-bob, as set forth.

Dated this 20th day of August 1891.

SIGMUND RIEFLER.
By H. F. Boughton, M.I. Mech. E.,
London, Sheffield, and Barnsley, Agent.

London: Printed for Her Majesty's Stationery Office, by Darling & Son, Ltd.—1891

Telephone
NORTHWOOD, 193.
Telegrams
ATKINSON, NORTHWOOD, 193.

WEST VIEW,
10, EASTBURY AVENUE,
NORTHWOOD,
MIDDLESEX.

Repl. Dec. 15th 38

12. 12 38

Dear W. Otto,

Best thanks for the papers about Rieffler Synchronisers which are just what I wanted to clear the matter up.

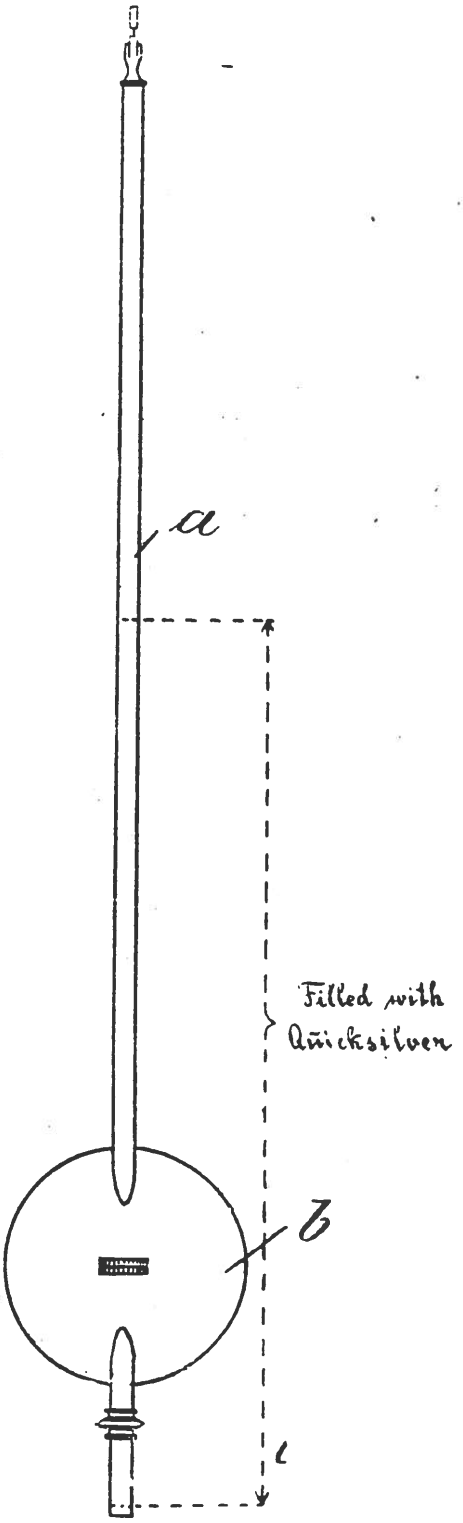
I see that Schuler refers to the counting which takes place in the slave unit.

Prof Lorquan was here last week he is on a visit from S. africa and has been paying some clock visits he has schemed a modification of the Shortt clock which seems an improvement. His synchronising scheme involves control of the rate of the slave pendulum as well as of its phase.

Yours sincerely

E. Atkinson

A.D. 1891. Aug. 24. N° 14,259.
RIEFLER'S Complete Specification.



London: Printed by Darling and Son Ld.
for Her Majesty's Stationery Office. 1891.

Malby & Sons, Photo-Litho

OBITUARY.

DR. SIEGMUND RIEFLER.

We regret to announce the demise of Dr. S. Riefler, who died at Munich at the early age of 65.

Riefler was born at Maria-Rain, in Bavaria, and was the son of a scientific instrument maker. After studying the engineering sciences at the Technical High School and the University of Munich, he took over, in conjunction with his brothers, the paternal business, which was enlarged and transferred to Nesselwang. He here designed the round system of drawing instruments, which for accuracy, interchangeability and convenience in handling have established a world-wide renown for the firm, whose leading spirit he was up to

Riefler was very much interested in horology, and occupied himself with the perfection of the standard regulator, and after more than twenty years of close application to the subject, he brought out a new form of escapement, which embodied a great many changes, and solved that problem clockmakers had been striving after ever since precision timekeeping became of paramount importance, a free pendulum.

The Riefler escapement belongs to the remontoir type; it receives impulse through the suspension spring, and is independent of the train irregularities. Along with this innovation he showed a new compensation pendulum, which gave very good results, and in 1898—five years after Professor Thury had made the first experiments with a nickel-steel pendulum—he constructed the first pendulum, after a well thought-out plan, and having the direct assistance of Dr. Guillaume, his efforts were crowned with success.

Those acquainted with the history of horology will be able to call to mind a number of instances in which the advancement of our craft was greatly helped by interested scientists, and here is another illustration to the point. Riefler indicated a new way, which has been successfully followed up by other notable workers, and which may yet lead to other interesting solutions, but will they be able to beat his record? He could claim the closest result ever obtained by a timekeeper, and with it, to have carried the error of a machine so close to the limit of perfection that it seems futile to improve on it.

The late Siegmund Riefler was a man of wide experience, great learning and perseverance, and also a man of a very retiring disposition, which is so often found in conjunction with these qualities.

The acknowledgment of his labours by the scientific world was very fittingly expressed when the University of Munich conferred upon him the degree of doctor in 1897; besides this, the late Dr. Riefler was the possessor of many honours; and in 1906 the distinction, "Counsellor of Commerce," was conferred upon him.

H. OTTO.

Riefler's Absolutely Free Escapement for Chronometers, Watches and Clocks.

IN this arrangement, which is the invention of Mr. S. Riefler, an engineer of München, the balance or pendulum is entirely free from escapement friction, as will be understood from an examination of the drawings appended. Mr. Riefler's departure is not a mere abstract idea, but a thoroughly well thought-out and practicable device, for he was good enough to submit to the writer a marine chronometer and a watch that had been going for many months, both fitted with his patented device, as well as the parts of a clock, illustrated overleaf, which had been taken from a regulator giving satisfactory results over a lengthened trial.

Fig. 1*a* is the elevation, and fig. 1*b* the plan of the arrangement for a chronometer or watch with a helical balance spring, though this form of spring is not at all necessary to the principle of the invention, the essential feature of which is that while one end of the balance spring *P* is attached to the balance *U*, the other end is fixed direct to the pallets at *K* without the intervention of lever and roller or other mechanism, so that the winding

Fig. 1a.

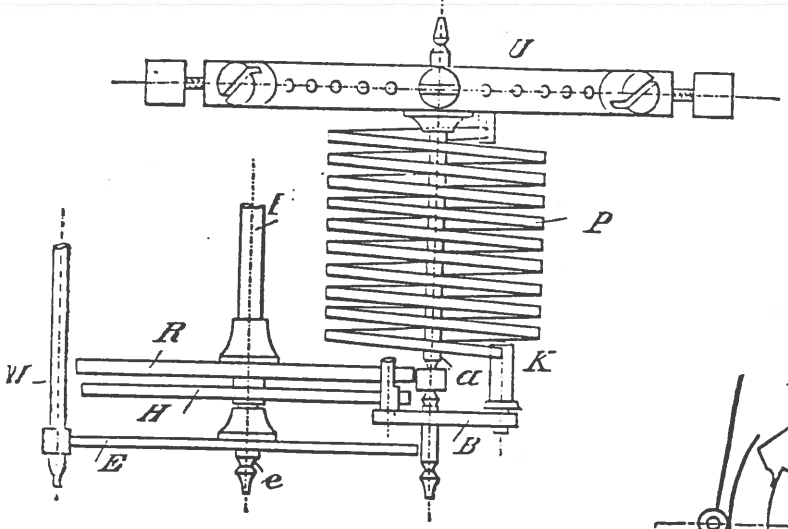


Fig. 2

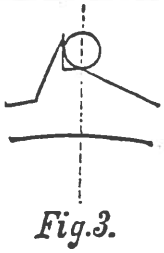


Fig. 3.

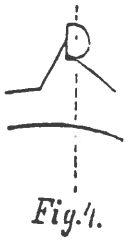
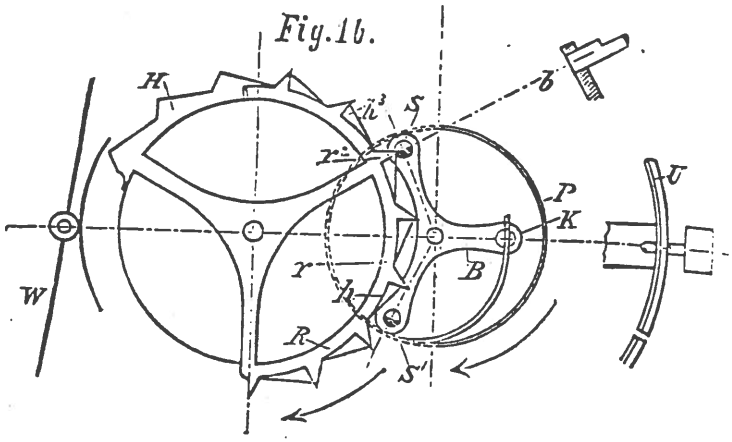


Fig. 4.

Fig. 1b.



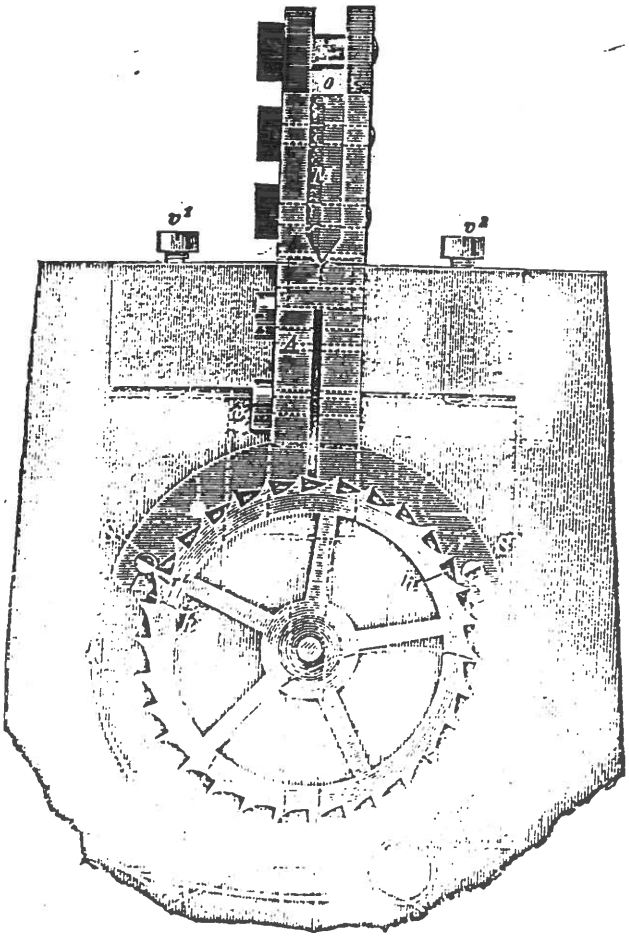


Fig. 5a.

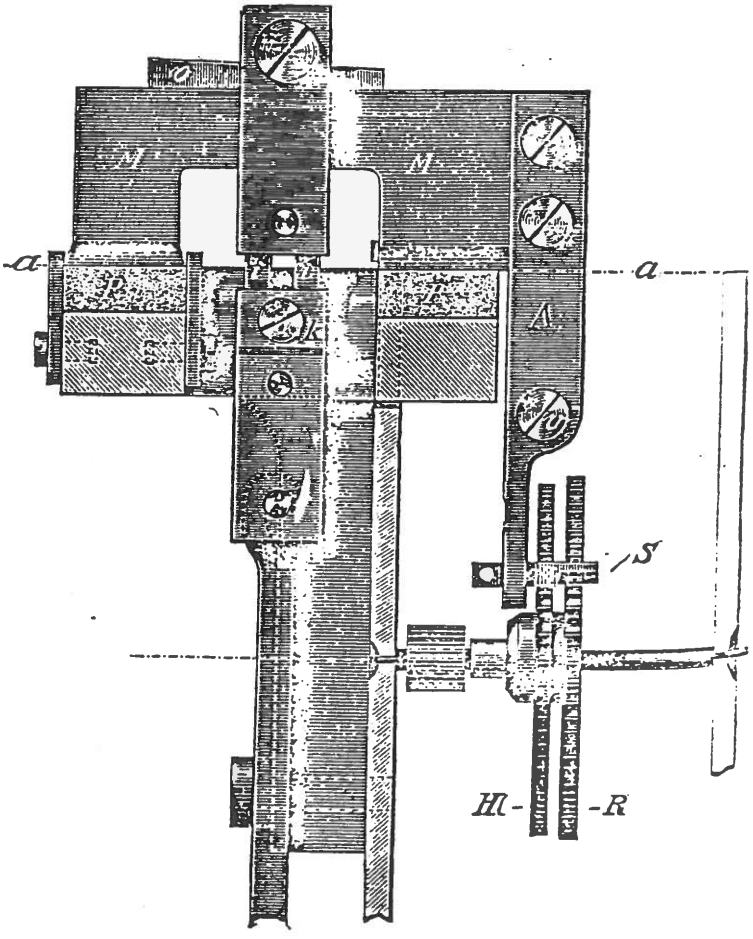


Fig. 5b.

up of the spring through the short angle moved through by the pallets impels the balance—in fact, the balance is really detached. There are two escape-wheels, one above the other, the upper one *R* for locking, and the under one *E* for giving impulse. Though a double escape-wheel may be desirable where there is plenty of height, as in a marine chronometer, it is not at all necessary, and in watches only one is used. The lower pivot of the balance staff *a* is carried in a bridge, which also serves to carry the upper pivot of the pallet-staff. At *e*, the arbor on which the escape-wheel is mounted, there is a toothed wheel *E* driving a pinion on which there is a fly *W*, which has been adopted more as a precaution than from necessity.

Fig. 2 shows the section of the double-toothed escape-wheel for watches when only one wheel is adopted for both the locking and impulse actions; figs. 3 and 4 the wheel tooth and pallet stone, which latter is circular for the impulse action and flatted off for the locking.

Figs. 5*a* and 5*b* show the application to a pendulum clock. Here the pallets *S* and *S*¹ with their anchor *A* are attached to a carriage *M* which rests on knife-edges at *P P*, and is therefore free to rock in the direction of the path of the pendulum. As the impulse is given by the escape-wheel to the pallet the carriage *M* is tilted and bends the suspension spring *i i* a little; though the movement of the spring is very slight it is quite enough to keep the pendulum going. The seats *P P* for the knife-edges are of agate, and may be adjusted through the screws v^1 and v^2. By means of the screw *U* the anchor may be opened or closed to give final adjustment to the pallets. *H* and *R* are the two escape-wheels for locking and impulse, as already described.

The foregoing description has been obligingly translated and condensed from the inventor's account by Mr. Haller. B. R.

Application of the Pendulum Escapement

With perfectly free pendulum, the impulse being communicated in the axis of oscillation and at the moment in which the pendulum swings through the dead point, of S. RIEFLER, Munich, Germ. Imp. Pat., No. 60,059.

IN this escapement the pendulum swings with perfect freedom, being connected with the clockwork solely through the pendulum-spring, from which it receives the impulse.

The impulse is communicated by the wheel-work bending the pendulum-spring a little at each oscillation of the pendulum, which produces a slight tension in the spring.

This tension-force of the pendulum-spring gives the pendulum the impulse. As this bending takes place round an axis which is identical with the axis of oscillation of the pendulum, and further occurs every time almost at the moment in which the pendulum is swinging through the dead point, we gain not only the perfect freedom of the pendulum, but also the great advantage that irregularities in the communication of force from the wheel-work and in the resistances to escape can exert no detrimental influence on the uniformity of the motion of the clock, which is not only in accordance with scientific theory, but has been practically proved by the excellent motion of numerous astronomical, turret, and other clocks provided with this escapement.

Fig. 1 of the drawings shows a front view, Fig. 2 a side view of the escapement on a scale of 5/6. Fig. 3 is the view from above in natural size. (Dimensions for astronomical clocks.)

Figs. 4 and 5 are illustrations of the suspension of the pendulum in actual size with axle and pendulum-spring.

TT is a strong cast-metal support screwed by 4 screws *u u* on to the back plate *W* of the clock. To this support are fixed the two bearing stones *P P*, the plane surfaces of which form together a horizontal plane.

On this plane lies the axle of rotation *a a* of the anchor *A*, the axle being formed by the knife-edges of the steel prisms *c c*. The axle of the anchor receives the necessary direction for the regular locking of the anchor in the escape-wheels *H* and *R* from the conical ends of the screws *K K*¹, which, however, are screwed back a little when the pendulum *B* is suspended, in order not to interfere with the free play of the anchor.

*F F*¹ is the suspension of pendulum placed on the anchor-piece *A A*¹, together with the pendulum-spring *i i*, the axis of curvature of which is identical with the axle of rotation *a a* of the anchor.

The escape-wheel is a double wheel, consisting of the driving-wheel *H* and the rather larger locking-wheel *R*. The teeth *h h*¹ of the former with their bevel surfaces effect the driving, the teeth *r r*¹ of the latter with their radial surfaces effect the locking.

S and *S*¹ are the driving, and at the same time the locking pallets of the anchor. They are cylindrical, and are bevelled at their front ends to the centre of the axis of the cylinder.

On the cylinder surface the driving of the anchor is effected by the teeth of the driving-

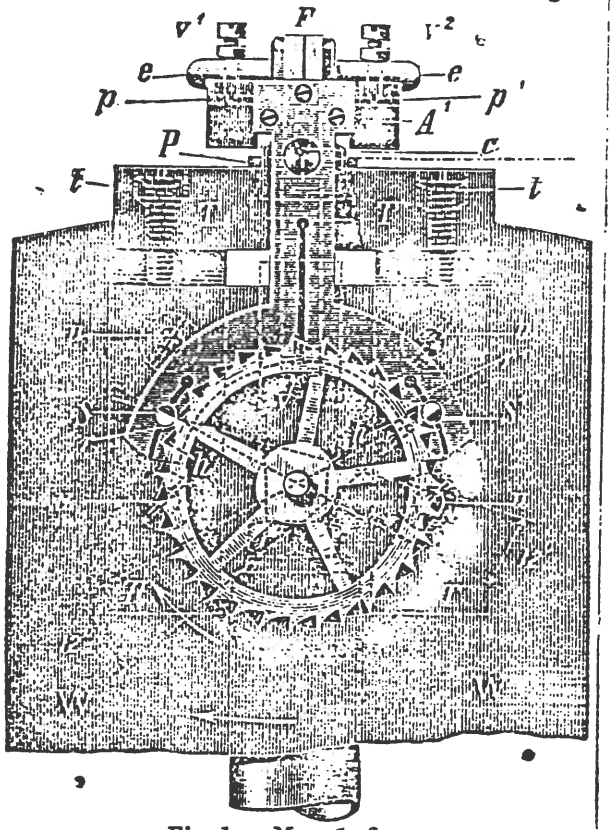


Fig. 1. M = 5 : 6.

wheel H, the locking is effected on the plane surfaces by the teeth of the locking-wheel R.

The play of the escapement is as follows:—

Fig. 1 shows the escapement at the moment when the pendulum is at the dead point and the tooth r of the locking-wheel rests on the plane surface of the pallet S.

Now, when the pendulum swings out to the left in the direction of the arrow, the pendulum-spring $i\,i$ at first remains quite straight, and the beginning of the oscillation takes place round the knife-edge axle $a\,a$ of the anchor. The anchor A, being connected with the pendulum by the pendulum-spring $i\,i$, will share this oscillation of the pendulum until the point of the tooth r of the locking-wheel falls from the locking surface of the pallet S —up to this point the pendulum has described an arc of about $\frac{1}{4}°$. By this time the cylinder surface of the pallet S^1 has approached the driving-tooth h of the driving-wheel up to the necessary nearness for play, the wheels revolve in the direction of the arrows until the locking-tooth r^1 lies on the plane surface of the pallet S^1, and during this revolution the driving-tooth h effects the driving: i.e. it forces the pallet S^1 back, and thus moves the anchor in an opposite direction to that in which the pendulum oscillates.

By means of this revolving motion of the anchor effected by the wheel-work, the pendulum spring $i\,i$ is slightly bent round the axis of oscillation $a\,a$ and thus receives a slight tension which imparts the impulse to the pendulum. The pendulum, however, does not immediately yield to the impelling force, but first completes its oscillation to the left, the anchor remaining the while at rest. This complementary arc amounts to $1—1\frac{1}{4}°$ in astronomical clocks, and to $2\frac{1}{2}°$ in large turret clocks.

As the pendulum returns, and after it has passed the dead point towards the right, the tooth r^1, which had been resting upon S^1, becomes free, and a fresh drive takes place on the other side by means of the tooth h^1.

The illustrations also show several small parts of the construction which have not hitherto been mentioned. Strictly speaking,

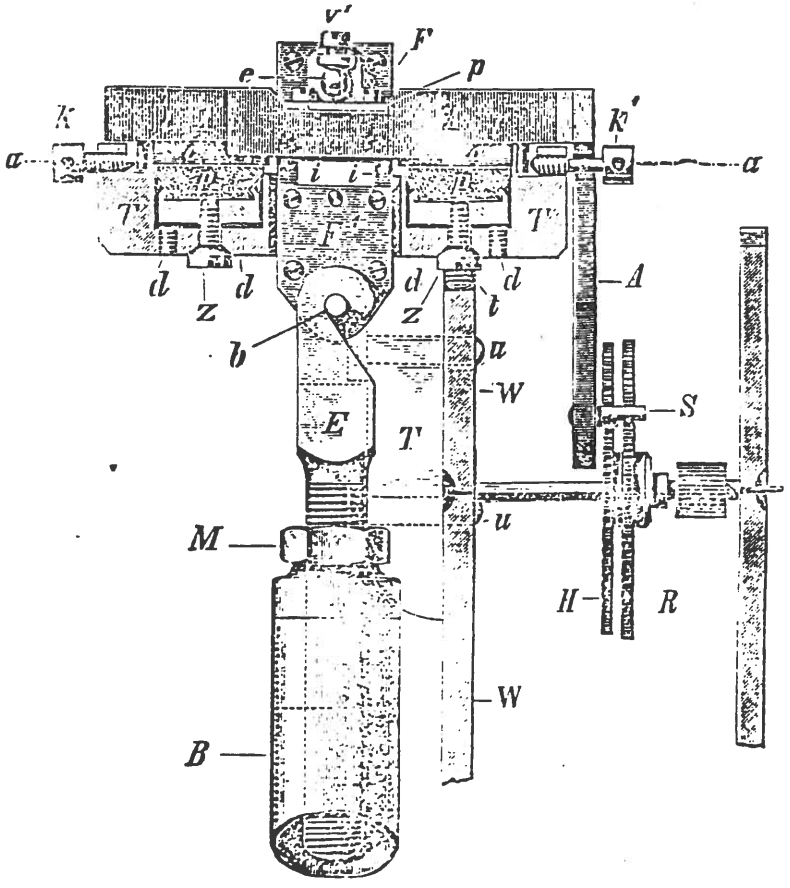


Fig. 2. M. = 5 : 6.

they have nothing to do with the working of the escapement, but are simply regulative appliances for the correct and convenient attachment of the escapement.

The conical screw v (Fig. 1) serves to regulate the breadth of the anchor, while the depth to which the anchor locks into the escape-wheels is regulated by the screws $t\,t$.

The screws $v^1 v^2$ of the pendulum suspension, which may be kept in position by small nuts, regulate the height of suspension of the pendulum in such a way that the axis of curvature of the pendulum spring $i\,i$ always coincides with the knife-edge axle as being the axis of rotation $a\,a$ of the anchor. At the same time this screw regulates the regular fall of the pendulum.

The conical surfaces of the bearing-screws $v^1 v^2$ of the pendulum suspension do not rest directly on the anchor-piece $A^1 A^1$, but on thin washer-plates $p\,p^1$, provided with corresponding hollows and screwed on to the anchor-piece $A^1 A^1$, but still allowing a little play in the screw-holes. In this way the knife-edge axle $a\,a$ may be made to coincide accurately in a horizontal direction with the axis of curvature of the pendulum spring.

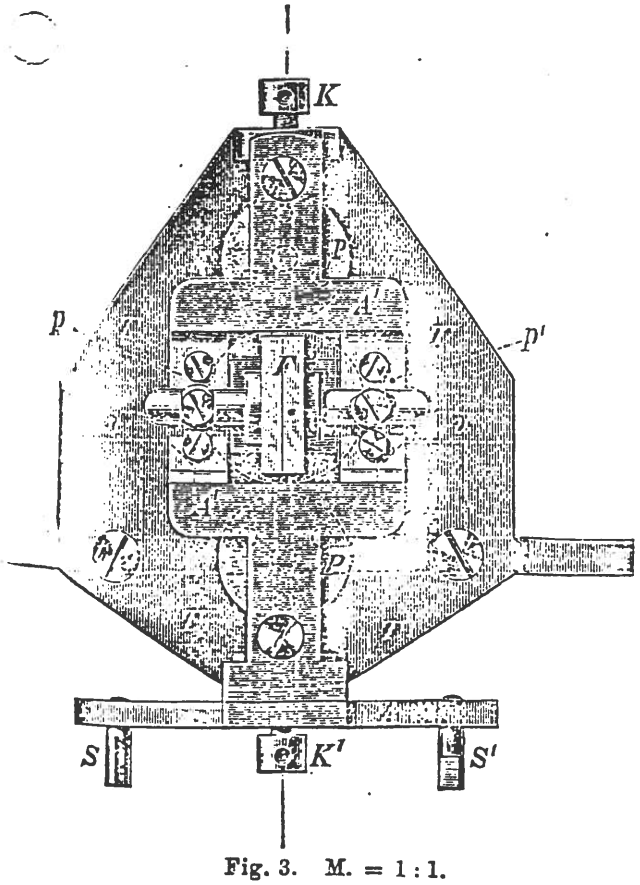


Fig. 3. M. = 1 : 1.

I and I^1 are screwed-in steel pins with conical hollows at the sides into which the conical points of the directive screws $K K^1$ fit.

Suspension of Pendulum.

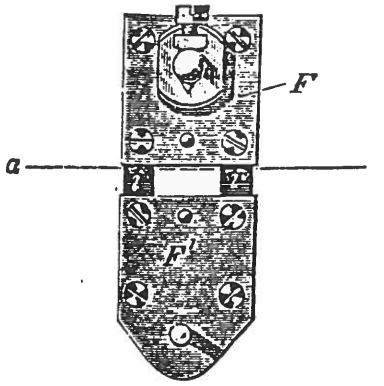


Fig. 4. M. = 1 : 1.

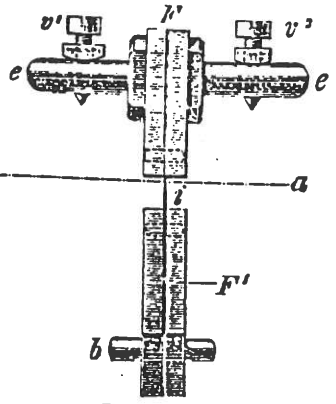


Fig. 5.

The bearing-stones $P\,P$ rest each with its brass frame on three pressure-screws, the thread of which is in the pendulum support T. By means of these screws the stones are brought to the required height, and also so adjusted that their plane surfaces form a common plane. The draw screws Z keep them in the required position.

It will easily be perceived that the resistances which operate on the pendulum in consequence of its connection with the clockwork, consist solely in the friction of the axle of the anchor, and in the resistance of discharge which arises when the teeth of the locking-wheel glide down from the locking surface of the pallets.

Both these resistances are extremely trifling and, in addition to this, of very constant magnitude.

The friction of the axle of the anchor consists simply of the imperceptibly small rolling friction of the steel knife-edges $c\,c$ on the perfectly plane and very hard bearing-stones $P\,P$. Moreover, this friction influences the pendulum only for a brief moment when the pendulum is swinging through the dead-point; that is to say, in that portion of the oscillation, amounting to only $\frac{1}{2}°$, in which the pendulum moves with the greatest speed. During the far greater part of the arc of oscillation the pendulum swings round the axis of the pendulum spring.

The resistance of discharge on the stone pallets S and S^1 is also almost zero, because the locking planes are not placed radially, but form an angle of about 10°—12° with the radius of the escape-wheels, which is equivalent to the angle of friction between stone and brass. The pallets are adjusted to slide,

and not to draw as is the case with the anchors of watches.

The danger of a premature discharge is excluded, because the pallets are pressed on to the teeth of the driving-wheel by the tension which the pendulum-spring undergoes when the pendulum swings out.

The principal advantages of the escapement are as follows:—

1. The pendulum swings with perfect freedom, and without being influenced by the clock-work.

2. The impulse is communicated to the pendulum in the axis of oscillation; and the impelling lever has consequently the least possible length. The length is merely a fraction of a millimetre, since the curvature of the pendulum-spring only extends over such a small space.

3. Irregularities in the transmission of force and in the resistances of discharge exert no disturbing influence on the regularity of the motion of the clock.

4. The supplementary arc of the escapement is in astronomical clocks 3 to 5 times, and in church clocks 8 to 10 times as great as the arc of discharge.

The pendulum is therefore to a high degree non-sensitive to disturbing influences of a mechanical character.

5. The number of working parts in this escapement is smaller than in any other known escapement. It consequently works with the greatest exactness.

Observations regarding Single Contact Tiffany Never-Wind clocks

(submitted by M.S.)

An important point in re-assembling the suspension assembly after replacing the spring (with a .004") is to be certain of proper reconnection of the safety wire at the top block. This is a thin copper wire which feeds through a hole in the suspension bracket and connects to a screw on the top block. It will be noted that there are 3 screws...2 to hold the suspension spring and the 3rd for this wire.

Why is it necessary, one might ask, and after careful observation, it will become apparent. The connection betweeen the top block and the frame of the mechanism would have to rely on the mechanical connection of the block and the bracket THROUGH the pin holding these parts together, and since the block is free to swivel to find its plumb position, the electrical connection is destined to be somewhat inadequate. Many master clocks that rely on a connection to the escape wheel, Standard Electric for example, utilize a spring-type brush to assure an acceptable connection. Other makers, like American Clock Company of Chicago, admonish the repairer to avoid oiling the arbor that forms a part of the electrical circuit.

The rule of thumb to follow in each case that involves electrical contact through a rotating or movable arbor or free support, is to avoid oil on these sufaces, and check for the presence of an auxillary device to re-enforce the intended connection.

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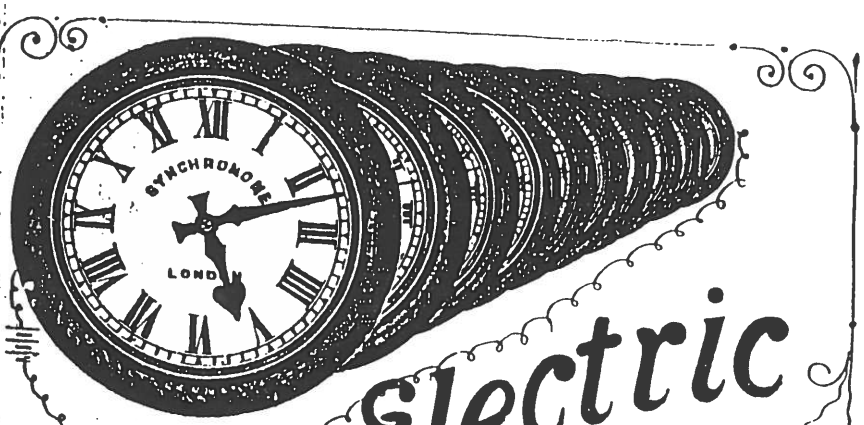

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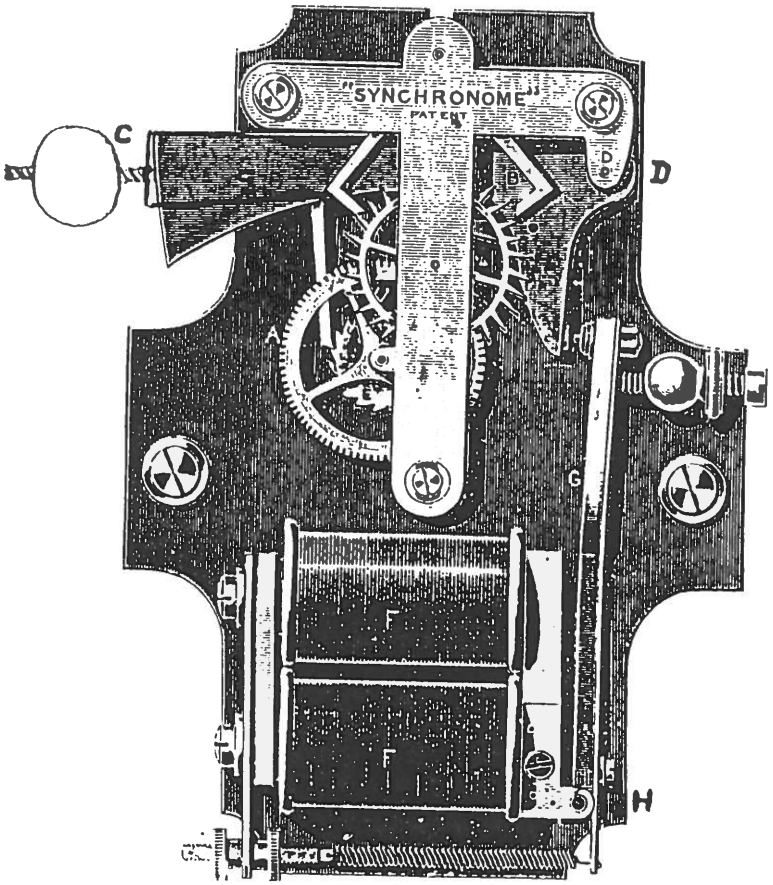


Front View of Mechanism of Central Regulator Clock or Self-wound Controller.

THE Central Regulating Clock or Self-wound Controller is an Automatic "timed contact maker." Its duty is to make and break an electrical circuit comprising any number of dials every half minute.

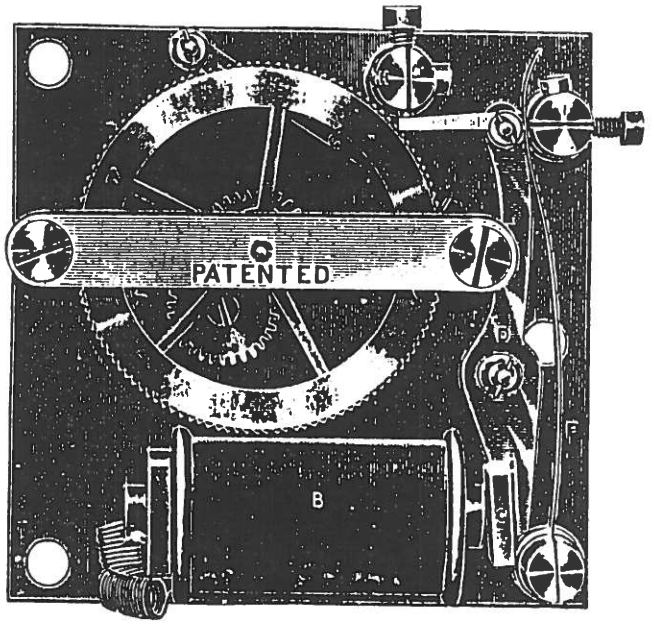
An ordinary pendulum is employed to control the progression of the wheel A by means of the escapement B. C is a weighted lever centered at D and bearing upon wheel A through the pawl and ratchet E. F is an electro magnet and G its armature centred at H.

The weighted lever in falling drives the clock, but its fall is limited by the contact screw in the tail of the armature which it reaches periodically after half a minute has elapsed. The circuit of the electro-magnet is completed at that point, and the armature is then attracted, and the weight is thrown up again on to another tooth of the ratchet wheel.

This electrical contact, occurring at each half-minute precisely, is the only contact in the system, and it is a very perfect one; a severe rubbing and thrusting action of the surfaces being obtained at every operation.

In all previous electric clocks, the contacts required for winding up the controlling clock and for sending out impulses to indicator dials, engage some moving part of the wheelwork. That is to say, their safety depends mainly upon the extent to which they rob the pendulum driving mechanism of the power which properly belongs to it. In the Synchronome System it will be noticed that the energy devoted to the purpose of making a reliable contact is considerable, but that it is not derived from the wheelwork; on the other hand it is obtained from the electro-magnet in its act of imparting power to the clock.

The excellent time-keeping of this clock is the result of the uniform pressure upon the escapement, and the absence of the train of wheels ordinarily required.



Back View of Indicator Dial.

THE mechanism behind the "indicator dials" or receiving clocks is a step by step movement which propels the hands half a minute at a time.

A is a wheel having 120 rectangular teeth, and is rigidly connected with the minute hand. B is an electro magnet with armature C centred at D and carrying a pawl E at its end. F is a spring, G a back-stop click, and H I are fixed stops.

The impulses from the controlling clock pass through the electro magnet each half minute, causing it to attract the armature and allow the driving click to pick up another tooth. The spring then carries it forward, the wheel remaining rigidly locked.

This instrument is very sensitive, and will operate with a contact having a duration of only one hundredth part of a second. It can never take up more than one tooth whether the contact is long or short.

It is thus practically impossible for the dials to be out of synchronization.

The dials are almost noiseless in action, and a perfectly silent movement can be put in whenever required.

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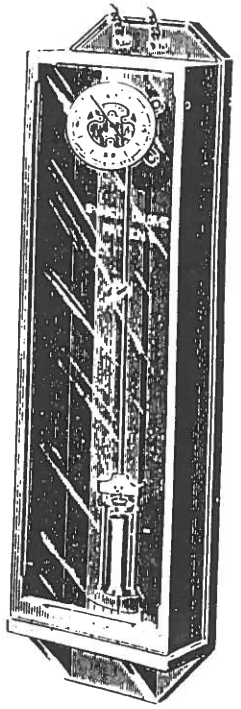

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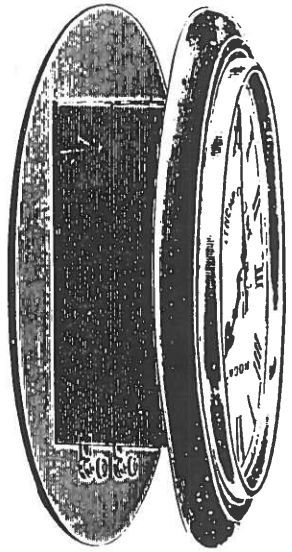

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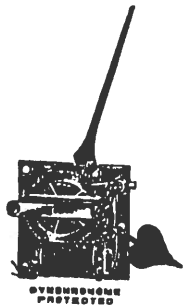

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SWCC Western Union 15½" convex "glass". Actually it is plastic, but it beats a naked dial. $20.00. (I'll pay UPS up to $5.00). Paul M. Hopkins, 2717 Millwood Rd., Birmingham, AL 35243 (205) 967-1237

Two rare **F.L. Gregory/Sempire** movements. One is a balance wheel, the other an **F.L. Gregory Co.-Chicago** with original dial. Have other battery clocks for trade. Want: **New England Continuous Electric** or **Bangor Clock Co.** Wall model battery wind. Steve Cunningham, 3200 Ashland Drive, Bedford, TX 76021 (817) 267-9851, Fax (817) 267-0387

McClintock Bank Vault Burglar Alarm, consists of: **E. Howard** 72 hour time switch, **Seth Thomas** 30 day time switch, knife switches, milliammeter, push buttons, and a drop flag annunciator strip. Dated 12/23/35 $750.00 fob Monroe Postman, 10 Yerba Buena, Los Altos, CA 94022 (415) 941-0433

STANDARD ELECTRIC TIME CO. ca. 1914 catalog reprint, 64 pp., $6.00 postpaid in USA; wiring diagrams, etc. also available. Jeff Wood, P.O. Box 5, Wilbraham, MA 01095 (413) 596-8250

SWCC Dials, also **ITR** Art Deco, 60 beat, self winding, 2 vial pendulum, weights, near mint. George Frederickson, 1716 West 100th Pl., Chicago, IL 60643 Evenings (773) 238-3294

MAGNETA, (pg. 89, 150 Yrs. E. H.) Exc. Cond. in factory black oak case, Hipp toggle, w/ invar pend., separate slaves, keeps exc. time, $650. **I.T.R. INTERNATIONAL**, wood cased master, 72 beat invar pend. program unit & matching 12" copper slave, 24 vdc, exc. cond, $350. **INTERNATIONAL**, wood cased control unit, 14" slave abv. brass program drum, requires 24 vdc min. impulse, glass door, exc. cond., $250. Bob Simon, 930 Townsend Rd., Groton, MA 01450 (508) 448-5547

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ase note ➔ Request for reprints of previously published material should be directed to the Chapter Historian: Dr. George Feinstein 75-19 195th Street Flushing, NY 11366

THE JOURNAL OF THE ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78
NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

VOLUME XXIII #3, SEPTEMBER 1997

Fellow Horologists:

This issue, in addition to continuing the REIFLER series, contains a reprint of a publication of 1913 in which the HOROPHONE is described. This was a radio receiving apparatus manufactured and marketed by the SYNCHRONOME folks, as additions to their clock systems. It seems that Mr. Hope-Jones didn't miss any opportunity to expand his firm's product line, describing his company as "Specialists in all applications of Electricity to Horology". In any event, the primitive nature of the device compared with results of modern technology, provides us with an insight that is both amusing and informative.

The Reifler portion of this issue discusses the charging conditions governing the recharging of the secondary cells used as the power source (accumulators), regulated by rheostats consisting of carbon filament incandescent lamps instead of the customary resistances. An interesting approach to current control, well worth the time to read and digest. Additionally, Reifler covers the mounting and regulation of his clocks... be sure to note his unique method of adding and subtracting weights from the weight tray on the pendulum, and the aneroid pressure compensation as well.

It is occasionally necessary to remind our members of the need for material for the Journals... usually when we see a limited supply on hand for future issues, as is the case at present. Please send your material, reprints of articles extant, as well as any originals. Tips, service hints, and repair experiences are all welcome.

The videotape of the Electrical Horology Exhibit presented by EHS members at the Eastern States Regional in Syracuse last year, (August 1996) is available at last, for sale and loan. Our chapter, in appreciation for its efforts, received a complimentary copy which we have set aside for loan to chapter 78 members. Additional copies are available for purchase through the chapter at the special discount price of $15 each. The tape covers the entire exhibit with commentaries by the individual donors. One of the highlights was the SELF-WINDING display by JEFF HOLZ which described the evolution of the various models, with each movement model set up in working condition, along with a variety of case styles shown.

continued on page 2

continued from page 1

The EHS meeting at the Eastern States Regional this past August had a record attendance of approximately 60 enthusiasts, indicating a clear increase in interest in electrical horology! Our chapter membership is currently 200, with about a dozen from Europe, Australia, and Canada.

Requests for phone numbers of chapter officers and directors have been received, and the following list should make it easier for contact with the appropriate member. We do not publish a roster of the general membership out of respect for their wishes, since many have opposed this practice and prefer their privacy.

*President:	Martin Swetsky, FNAWCC	(NY)718-646-7489
*Vice-President & Historian:	Dr. George Feinstein	(NY) 718-479-6184
*Secretary-Treasurer:	Harvey Schmidt, FNAWCC	(NY) 718-969-0847
*= Journal Editorial Team		
#2nd Vice-President:	H. William (Bill) Ellison, FNAWCC	(MI) 313-882-9380
#= Chapter Highlights Correspondent		
Director:	Elmer Crum, FNAWCC	(FL) 813-868-0181
Director:	Leon O'Briant	(NC) 919-851-1706

In addition to the members listed above, many others have frequently assisted in various chapter activities without an official title, and we thank them and apologize for any omission or unintended slight.

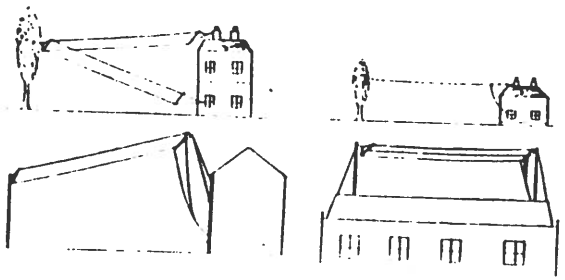
Enjoy this issue, good reading ahead...

Martin Swetsky, FNAWCC, President
Harvey Schmidt, FNAWCC, Secy-Treas.
Dr. George Feinstein, Vice-President
} Co-Editors

AERIALS.

An elaborate or lofty aerial is not essential for receiving the Paris and Norddeich Time Signals. Paris can be heard quite well on a single wire, 20 or 30 ft. long at a height of 20 ft. or so above the ground, but the loftier and longer the aerial the louder will the the signals be and it is preferable to use two or three wires in parallel instead of one. It is often possible to dispense with a mast altogether by making use of a neighbouring building or a tree or a couple of short poles can be attached to chimney stacks if far enough apart.

Effective insulation of the aerial is desirable, and care should be taken that the leading-in wire is kept clear of any buildings, iron gutter pipes or stay wires. The following sketches will serve to suggest some simple forms easy of erection.



MATERIALS FOR AERIALS will be quoted for on application, and we will advise intending purchasers of the Horophone as to the design of a suitable aerial if dimensioned sketches of the premises and surroundings are submitted with questions.

CONNECTION TO EARTH. A really good earth connection is essential and can usually be obtained by soldering a wire on to a water pipe, preferably where the main enters the premises instead of higher up where taps may intervene. The gas pipes should not be used for earthing purposes, but they are often successful as a substitute for an aerial, at any rate in the Southern and Midland Counties.

THE SYNCHRONOME COMPANY LIMITED

32 & 34, CLERKENWELL ROAD, LONDON, E.C.

Telephone No Holborn 4643.

Alf. Geo. Jackson

WIRELESS TELEGRAPHY

28/11/13

INSTALLATIONS SPECIALLY DESIGNED FOR RECEIVING THE

TIME SIGNALS

from the Eiffel Tower (Paris Observatory) and Norddeich (Wilhelmshaven Observatory).

According to the new arrangements of the International Time Service, inaugurated 1st July, 1913.

THE HOROPHONE

consists of a complete set of instruments necessary for receiving wireless messages. The apparatus is mounted on a handsome polished hardwood board in a very small compass, and all that is required is an aerial wire and a connection to earth. If the user is accustomed to the Morse Code, wherever he may be in the British Isles, he can also with this simple equipment listen to the Weather Reports and other news despatched from Paris, Norddeich, and similar high power Stations within a radius of 800 miles. A license from the Postmaster-General should be applied for. We will give advice as to erection of the aerial and all necessary assistance in filling up the application form.

THE SYNCHRONOME COMPANY LIMITED,

32 & 34, CLERKENWELL ROAD, LONDON, E.C

F. HOPE-JONES, M.I.E.E. (Managing Director)

Specialists in all Applications of Electricity to Ho[illegible]ogy

Programme of Wireless Signals Despatched from the Eiffel Tower, Paris.

(Corrected to October, 1913.)

Ordinary Time Signals, 10 a.m. and midnight. Time Signals according to the old code are still being despatched from 10.44 to 10.49 a.m.

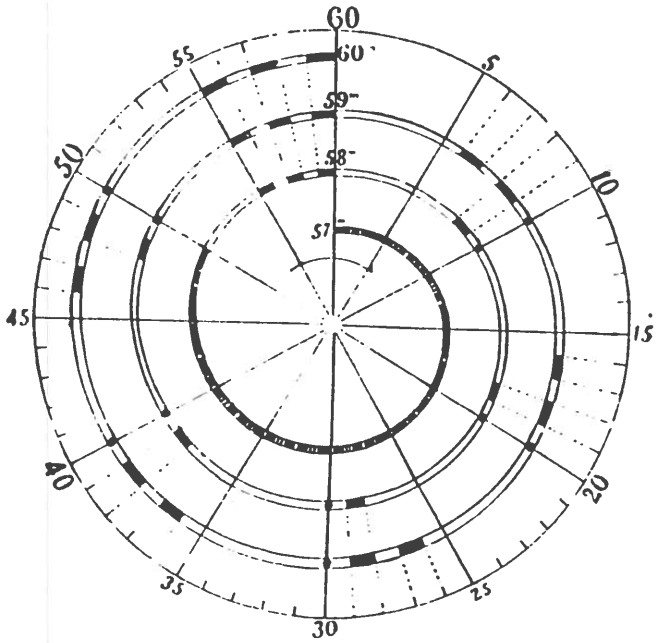
Scientific or Rythmic Time Signals, preceding the midnight Time Signals.

Two Weather Reports, one immediately after the morning Time Signals, and one at 5 p.m.

Experimental Signals, for the benefit of those studying the variation in strength of signals received, sent twice a day immediately preceding the ordinary Time Signals.

International Service of Time Signals.

The International Service of Time Signals is shown in the following spiral diagram. From the end of the 57th minute of the hour, warning signals are sent out consisting of the letter X (– · · –) repeated for fifty seconds, followed by silence for five seconds, after which the first time signal is given,



consisting of three dashes each lasting for one second, separated by intervals of one second. Thus the end of the third dash coincides precisely with the end of the 58th minute. Afterwards the letter N (·) is sent every ten seconds, followed by the second time signal, and finally a series of G's (– – ·) followed by the third time signal, the last dash ending precisely at the hour. These signals will be sent out from the Eiffel Tower daily at 10 a.m. and midnight, with a wave length of about 2,500 metres, and from Norddeich at mid-day and 10 p.m. Greenwich Mean Time is of course referred to in both cases, France having adopted our meridian in March, 1911, by dropping 9 minutes, 21 seconds.

RYTHMIC SIGNALS.

If greater accuracy in the determination of time is required than can be obtained by the ordinary time signals, the rythmic signals or "clock beats" transmitted from the Eiffel Tower at 11.45 to 11.50 p.m. will enable the time of any clock to be compared to within one-hundredth part of a second. The signals consists of 300 short dots (the 60th, 120th, 180th and 240th being suppressed to facilitate counting) regularly spaced at intervals of ·98 seconds apart. By listening to these beats and at the same time to the beats of the clock or chronometer to be compared, it is easy to note the exact times at which coincidences occur and at which beats. The precise times of the first and last rythmic signals are given shortly after midnight in the form of two groups of 6 figures, as for example: 450815, 500117, repeated thrice, indicating that the first and last signals were sent out at 45 min. 8·15 secs. and 50 min. 1·17 secs. respectively. By this means also a ship can ascertain its longitude with a precision hitherto unattempted, and although such a high degree of accuracy is not often required on land, except for surveying purposes, it is highly appreciated by anyone who is keen on the accurate measurement of time.

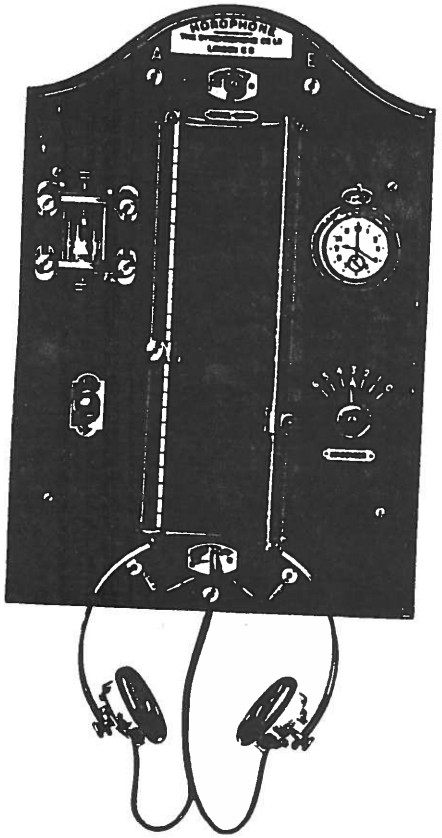
THE HOROPHONE.

Comprising double slider Inductance, Crystal Detector, Variable Condenser, Battery, Buzzer, 2,000 ohm single head-gear Telephone, Hook for chronograph watch, aerial and earth terminals.

Price £6:16:6.

Price with double head-gear Telephones - £7:10:0.

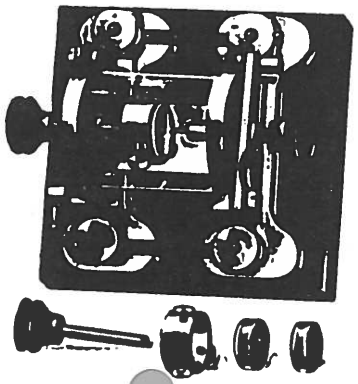
Price with Chronograph Watch - - £9:0:0.



Neatly mounted and joined up ready for use on a polished walnut board suitable for hanging on the wall. 18 in. high × 12 in. wide.

CRYSTAL DETECTOR,

as supplied on the above, is fitted with two substantial aluminium castings, mounted on the base by four screws. A cup with three screws is provided for holding the Crystal, and a brass point selector, perfect selection being obtained by means of the locked ball and socket adjustments. A glass cylinder encloses the crystal and point, and the whole detector can be taken to pieces in a few seconds by simply loosening the fixing screws. The crystal supplied is prepared by a special process and will be found very sensitive and easy of adjustment. No local battery is required, in fact applied E.M.F. renders it less sensitive. Other crystals can of course be used if desired.



Price complete with Crystal 18/6.

How to Adjust and Use the Horophone.

FOR the benefit of those unacquainted with wireless apparatus we give the following hints as to its adjustment and operation: The instrument should be erected on a wall free from vibration and preferably in a room where one is not likely to be disturbed by noise. Having joined up the aerial and earth wires to the terminals at top of board marked A and E respectively and withdrawn the plug in the centre, place the telephones over the ears and proceed to adjust the detector as follows:

Loosen the two small clamps on the top and bottom of the crystal detector (on the left of the instrument) about half a turn and manipulate the little vulcanite knobs until the pointed end of the spiral brass wire is resting on the crystal in the cup. Now press the button on the case underneath the detector and operate the buzzer which acts as a very weak transmitter of electrical waves, and if the detector is in adjustment, a loud buzzing will be heard in the telephone. Failing this, move the point of the brass wire over the surface of the crystal until a sensitive spot is found, then regulate the pressure of the point until the sound is loudest, clamping it up again when the best result has been achieved. Some parts of the crystal are more sensitive than others and can only be found by trial.

Those unaccustomed to wireless apparatus will do well to commence with the Eiffel Tower signals. With a fairly long aerial the position of the sliders on the coil will be approximately as shown in the illustration, the shorter the aerial, the lower down will be the sliders, but the correct position must be found by moving them up and down until the signals are sharpest. They can then be still further strengthened by adjusting the variable condenser.

When the apparatus is finished with, never forget to replace the plug at the top of the board. This connects the aerial direct to earth and protects the instruments from lightning.

WEATHER REPORTS.

The Morning Weather Report from the Paris Bureau Central Meteorologique (B.C.M.) is sent immediately after the Time Signals according to the following code:

R. Reykiavik (Iceland).
V. Valentia (Ireland).
O. Ouessant (Ushant, Brittany).
C. La Corogne (Spain).
H. Horta (Azores).
S St. Pierre & Miquelon (Newfoundland).

Each letter is followed by a group of 7 or 8 figures, of which:

1.2.3. Represent height of Barometer in m.m. after adding 700.

It is rarely that the tens will be less than 3 or more than 7.

4.5. Represent Direction of Wind (See Table A).

The first of these figures can only be 0, 1, 2, or 3.

6. Represents Force of the Wind (See Table B).

Double these figures and you will get the speed of the wind in metres per second.

7. Represents State of the Sky (See Table C).

8. Represents State of the Sea (See Table D).

These figures are usually the same as those indicating the Force of the Wind.

Omissions are represented by the letter X (- · · -).

TABLE A.

DIRECTION OF THE WIND.

0 2	N-N-E	1 8	S-S-W
0 4	N-E	2 0	S-W
0 6	E-N-E	2 2	W-S-W
0 8	E	2 4	W
1 0	E-S-E	2 6	W-N-W
1 2	S-E	2 8	N-W
1 4	S-S-E	3 0	N-N-W
1 6	S	3 2	N

TABLE B.

FORCE OF THE WIND.

		Speed Corresponding Metres per Second
0.	Calm ...	0 to 1
1.	Light air ...	1 to 2
2.	Light breeze	2 to 4
3.	Gentle breeze	4 to 6
4.	Moderate ...	6 to 8
5.	Fairly strong	8 to 10
6.	Strong ...	10 to 12
7.	Very strong	12 to 14
8.	Gale ...	14 to 16
9.	Hurricane	above 16

TABLE C.

STATE OF THE SKY.

0. Fine
1. Slightly cloudly
2. Cloudy
3. Very cloudy
4. Overcast
5. Rain
6. Snow
7. Misty
8. Fog.
9. Storm

TABLE D.

STATE OF THE SEA.

0. Calm
1. Very smooth
2. Smooth
3. Slight
4. Moderate
5. Rough
6. Very rough
7. High
8. Very high
9. Phenomenal

In addition to weather reports of the six meteorological stations mentioned above (which are transmitted slowly to facilitate de-coding) there follows in ordinary language, first, some indication of the general atmospheric conditions in Europe; secondly, groups of 7 or 8 figures according to the same code for Western Europe, from Paris, Clermont-Ferrand (C) Biarritz (B), Marseilles (M), Nice (N), Algiers (A), Stornoway (SY), Shields (SH), le Helder (HE), Skudesness (SK), Stockholm (ST), Prague (P), Trieste (T), Rome (R); thirdly, general forecast of sky and wind for France, and fourthly, force of the wind at the Eiffel Tower at 7 a.m. and forecast of its force in the evening.

The Evening Weather Report, sent at 5 p.m. is supplementary to that sent out in the morning and gives a more precise forecast for the following day. It consists, first, of 8 groups of figures according to the same code as the Morning Weather Report, from Paris (B.C.M.), Brest (BR), Biarritz (BI), Nice (N), Valencia (V), Skudesness (S), Rome (R), La Corogne (C); secondly, forecast of barometer and weather; thirdly, the force of the wind at the Eiffel Tower at 4 p.m. and probable force on the following morning, and fourthly, an indication as to whether the conditions are settled.

EXPERIMENTAL SIGNALS.

A very wide field is open for experimental work in Wireless Telegraphy, and a Committee of the British Association has been formed to organize such work, and in particular to investigate such phenomena as the influence of sunrise and sunset, of daylight and darkness, and of meteorological conditions on the propagation of electric waves over long distances, and the relative intensity with which they are received.

The experimental signals are intended to assist in these investigations, and are invariably transmitted with the same power and wave length, which is also the same as that used for the Time Signals. They are sent at 9.52 a.m. and 11.52 p.m., and consist of six dashes each lasting 5 seconds, separated by intervals of 5 seconds, and preceded by three call signals ( )

CLEMENS RIEFLER
Fabrik mathem. Instrumente
NESSELWANG / Germany

MOUNTING INSTRUCTIONS

for the RIEFLER Astronomical Clock Type A. 3 -

in dust-tight wooden casing

The room in which the clock is to be erected, must be dry, free from vibrations, must have temperatures as constant as possible, and must be protected against the sun-rays.

Mounting of the Clock Type A. 3 with the RIEFLER gravity escapement.

At these clocks the clock-work as well as the clock-casing are fixed separately to the wall so that they do not touch each other at all. Therefore the vibrations which might appear in the clock-casing by opening the door, are not transferred to the clock-work. The clock-work is fixed to a cast-iron plate "D" (Fig. 1), which plate is bolted to the wall and the clock-work is screwed on two wooden boards "II" and "III" which are nailed to the wall.

At the mounting of the clock we have to perform the following actions successively :-

1. Fix the cotter bolts m^1, m^2 and m^3 (Fig. 1) to the wall, distribute them in a triangle, with a distance of the three points of 12 1/2 cm and screw them as deep as possible into the wall so that the threaded pin hardly protrudes the on-screwed nuts. No cement will be required.

2. Fixing of the wall-plate "D". In order to be able to tighten the nut of the cotter bolt m^2 the stay-bolt "B" must be unscrewed. After the tightening of the wall-plate this stay-bolt must be screwed in so that the flatted part at the front of the bolt is in vertical direction.

3. Fixing the clock-casing at the wall. As already mentioned above, the clock casing must be fixed so that the clock-work and wall-plate "D" are completely independent from the clock-casing, i.e. they may not touch each other at all.

For this purpose first the wooden board "H" (Fig. 1) must be nailed directly above the wall plate "D" by means of the hardened steel pins, or fixed so that it does not touch the wall plate. The distance between the wall plate center and the wooden board center should be 12 cm, and a distance of 2 to 5 cm between the wooden board and the upper end of the wall plate will be sufficient.

Then the lower wooden board "H1" will be planed to the required thickness so that the front surfaces of the two wooden boards are in one vertical plane, which you can check up by a plummet. Also the lower board is to be fixed to the wall and then the rear-wall "G" of the clock casing must be screwed to the wooden boards by the screws "d" and "d1". For this purpose the rear wall must be taken out of the clock casing.

The four holes in the rear wall of the clock casing are of such a diameter that the rear wall can be slightly moved to all directions by putting it into the exact vertical position.

If now the rear wall is brought into the correct position a metal screw shall be fixed into the holes above the wall plate as security against displacement.

4. Packing and tightening of the clock casing. In order to keep the casing free from dust the spaces between the round cut of the rear wall and the cylinder shall of the wall plate "D" and also the opening for stay bolt "B" shall be packed with the attached cotton-wool cord.

5. Fixing of work frame "I" "J" together with the clock work to the wall plate "D" (Fig. 2). First the nut "w" is to be tightened only slightly, then

6. adjust the clock-work so that the surface of the agate-plates "P P" (Fig. 3 - 5), on which rest the steel-knife edges of the pallet, will be horizontal. For this purpose the spirit level must be put in different directions on the small table "O". The correct position will be attained by adjusting the screws "n - n1" (Fig. 2) and the long adjusting screws "ϑ" (Fig. 2). These adjusting screws have their thread in the work frame and are acting on the stay-bolt "B". The said small table "O" is situated at the right upper corner of the escapement, and its surface is parallel to the surface of the agate-plates "p p".

After this, the adjustment nut "w" (Fig. 2) must be fully tightened.

Before suspending the pendulum the stopping lever "L" must be turned into the vertical position, and the screws "a a" (Fig. 3 - 5) by which the lower part "F1" of the pendulum suspension is fixed, shall be fully tightened.

7. Fixing and adjusting of the aneroid at clocks with air pressure compensation.

a) Air pressure compensation with lever transmission and pointer.

During transport of the clock the connection between the aneroid boxes and the transmission lever is interrupted by loosening the black steel screw at the upper axis. For the adjustment of the aneroid you first have to loosen the knurled nut which is above the center of the aneroid box so that the spring below the nut is fully slackened. Hereupon we are tightening again this nut until it touches the guide which is turnable between two screws. Now we turn the nut by about two turns further. After having roughly adjusted the pointer to the lower number 30 of the scale, the small steel screw which is situated at the upper axis is to be tightened, by which the pointer-work and the aneroid boxes are connected. By a further tightening of the abovementioned knurled nut the pointer is adjusted to the present barometer state, whereby number "O" of the aneroid scale corresponds to the mean barometer state of the respective place where the clock is installed.

At pendulums with stratification compensation the aneroid is fixed to the pendulum bar by sliding it from the above on the pendulum bar until it rests on the box. This box is situated below the stratification compensation device and is already fixed to the pendulum. The aneroid is to be fixed by the three screws at the box. Be careful not to displace the box at the pendulum !

At pendulums without a stratification compensation we are sliding the aneroid from the above on the pendulum bar until the box which is fixed at the bottom plate of the aneroid rests on the steel pin at the pendulum. Then the two clamping screws at the box must be tightened.

b) Air pressure compensationwithout lever-transmission and pointer.

This air pressure compensation needs no further adjustment, it is fixed to the pendulum as per paragraph a).

8. Pendulum suspension. We have to suspend the pendulum at the pin "b" of the pendulum suspension with the opening of the hook towards the front of the pin "b" (Fig. 4). Just before the pendulum is set in motion we have to unscrew the clamping screws "a a" which are situated at both the sides of the pendulum suspension "T T" and serve for fixing the lower part "F1", so that the steel knife edges will not be damaged during suspending the pendulum.

9. Fixing the weights tray. The tray for the small regulating weights must be fixed so that the upper tray surface is in one line with the mark at the pendulum. (about 49.7 cm from the above).

10. Fixing the oscillation ruler. The support for this oscillation ruler being of German silver, is fixed to the rear-wall of the clock casing by two metal screws at a suitable hight. For the exact adjustment the oscillation ruler is designed slidably.

11. Now the three dry-cells for the electric winding are to be connected. The clock is provided with an electric winding which usually is fed by three dry elements which are in series connection. These dry elements must be protected against temperatures below 0^{o} Celsius, and must be connected to the pole-clamps of the pertaining clock-cable. The switching of the clock-winding is shown in Fig. 8.
The live-time of the dry elements is about two years.

12. Loosening of the pendulum suspension "Al" by turning the stopping-lever "L" (Fig. 3 - 5) from the vertical into the horizontal position. In order to prevent a damage of the steel-knife edges during the transport of the clock the pendulum suspension "A l" is locked, i. e. it is slightly lifted so that the steel knife edges will not get in touch with the agate plates. By turning the lever "L" from the vertical into the horizontal position the pendulum suspension "Al" is moved down, so that the steel-knife edges of the pallet will now rest on the agate-plates "P P", (this installation works similar to the steel-knife edges locking device of a precision balance) whereupon the pallets "S Sl" will gear exactly into the teeth of the gears.

13. Regulation of the pendulum oscillations. Here we have to consider the following rule :- If the pendulum swing to the right side lasts longer than the one to the left, we have to turn the screw "N" at the pendulum suspension slightly to the left. If the pendulum oscillation to the left side lasts longer than the one to the right, we have to turn this mentioned screw slightly to the right. But please do not turn this screw too far as a screw turn of 1/8 is of remarcable influence to the pendulum oscillations. Before we are turning this screw "N" we have to arrest the pendulum suspension "Al" by turning the lever "L" from the horizontal to the vertical position. After having turned the regulating screw "N" we have to bring back the lever "L" into the initial position.

14. Regulating the current intensity of the electric winding. In order to be able to regulate the current we have to interconnect a resistance "R" (Fig. 8) to the circuit of the battery "U" which battery consists of three dry-elements. The resistance shall be adjusted by the button below the electromagnet so that the electric winding of the weights lever which gives the impulse to the clock will follow every 34 to 38 seconds.
As the voltage of the battery, which is at new elements 3 x 1.4 = 4.2 Volts, decreases in the course of the time it should be monthly overchecked to see whether the weights lever is still being raised sufficiently. If the hub takes place in shorter intervals than in 30 seconds so the resistance will have to be adjusted to a somewhat lower value.
It is not advisable to connect a battery of a higher voltage than 4 Volts as otherwise the electric contact will suffer.

In order to be able to easily clean the contacts, which will be necessary after two or three years use, the clock dial is at the corresponding place provided with an opening, and a small file is furnished to the clock for cleaning the contacts. The contact may not be cleaned with sand paper as the small grains might stick to the platinum and so act as insulators.

15. Regulation of the clock rate. The rough regulation follows by screwing the pendulum bob-part. Hereby please take into consideration paragraphs 17 - 20 of this instruction.

The regulating nut at the pendulum is devided up into 100 graduations, therefore are 2.5 graduation intervals = 1 second. One turn of the regulating nut changes the daily rate at the first-class quality pendulums type J by 40 seconds. At pendulums type K one turn of the regulating nut changes the daily rate by 32 seconds, one graduation interval = 0.6 seconds. After the regulation the counter nut above the regulating nut must be tightened.

It is advisable to adjust the rate of the clock thus that the clock is late by 1/4 to 1/2 seconds daily which difference will be adjusted by using the small weights.

After the adjustment of the regulating nuts and suspension of the pendulum the screws "a a" must be unscrewed again.

The fine adjustment will be done by using the additional weights.

If we are informed about the latitude and height above sea-level of the place where the clock is to be set up we are adjusting the pendulum in our laboratories thus that only the fine adjustment by means of the additional weights will be necessary.

16. Adjusting the clock to the exact time. At adjusting the clock to indicate the correct time it is possible to set the hours- and the minutes hand back or forth. But never turn the seconds-hand as it is fixed to the axle of the scape wheel and the marking of second "O" on the chronograph stripe would not further correspond to the position of the hand at the seconds dial. However, you may stop the seconds hand by putting your finger before it whilst the pendulum continues swinging.

In case the seconds hand should have been slightly destored at the axis during transport or unpacking of the clock so that it would not correspond any more with the graduation lines of the seconds dial it can be corrected by arresting the scape wheel at its teeth by your hand.

If, for any reason the pendulum should be unhooked, please follow the instructions, mentioned below :-

17. Stop the pendulum

18. Arrest the pendulum suspension "A1" by turning the arresting lever "L" from the horizontal into the vertical position.

19. Tighten the clamping screws "a a" until the pendulum support is clamped. Herewith it is of no importance which screw will be tightened first, until the screw head rests on the pendulum support "T T".

20. Now unhook the pendulum.

21. Adjustment of the Synchronization Equipment. At clocks with synchronization equipment it is important that the electro-magnet for the synchronization equipment is brought into its correct position, i.e. it must be so far at the left side of the initial position of the pendulum that the pallet with the pendulum is swinging some millimeters above the center of the magnet-iron, if the electro-magnet is not under electric current. The space between the magnet-irons of the electro-magnet and the pallet swinging above them shall be about 1 to 2 mm. The herefore necessary adjustments of the electro-magnet as well as its exact position in the vertical direction to the casing wall will be attained by the armature on which the electro-magnet is fixed.

The pendulum of the clock is to be regulated that it is in advance by 0 to 2 seconds daily, if there is no current passing the electro-magnet, and only then it may be set under synchronization current.

22. The mechanical adjustment for correcting the clock-rate.
This mechanical adjustment (please see Fig. 9) consists of two levers at which two weights of about 2 gramms each are suspended by a silk-thread.

The rear weight always rests on the pendulum tray and the other one is suspended freely above this tray.

If an acceleration of the clock rate is required you turn the respective lever so that the front weight lies on the tray. Herewith an acceleration of the oscillation of about 5 seconds per 24 hours respectively 0.2 seconds an hour, is attained. After this correction you lift the weight from the tray again.

In case a retardation of the clock rate is requested you lift the rear weight by turning the respective lever and you will get a retardation of about 0.2 seconds an hour.

The correction of the clock rate by this mechanical adjustment is much quicker than by changing the small additional weights which you usually get with the pendulum, as they correct only 1, 0.5 respectively 0.2 seconds a day.

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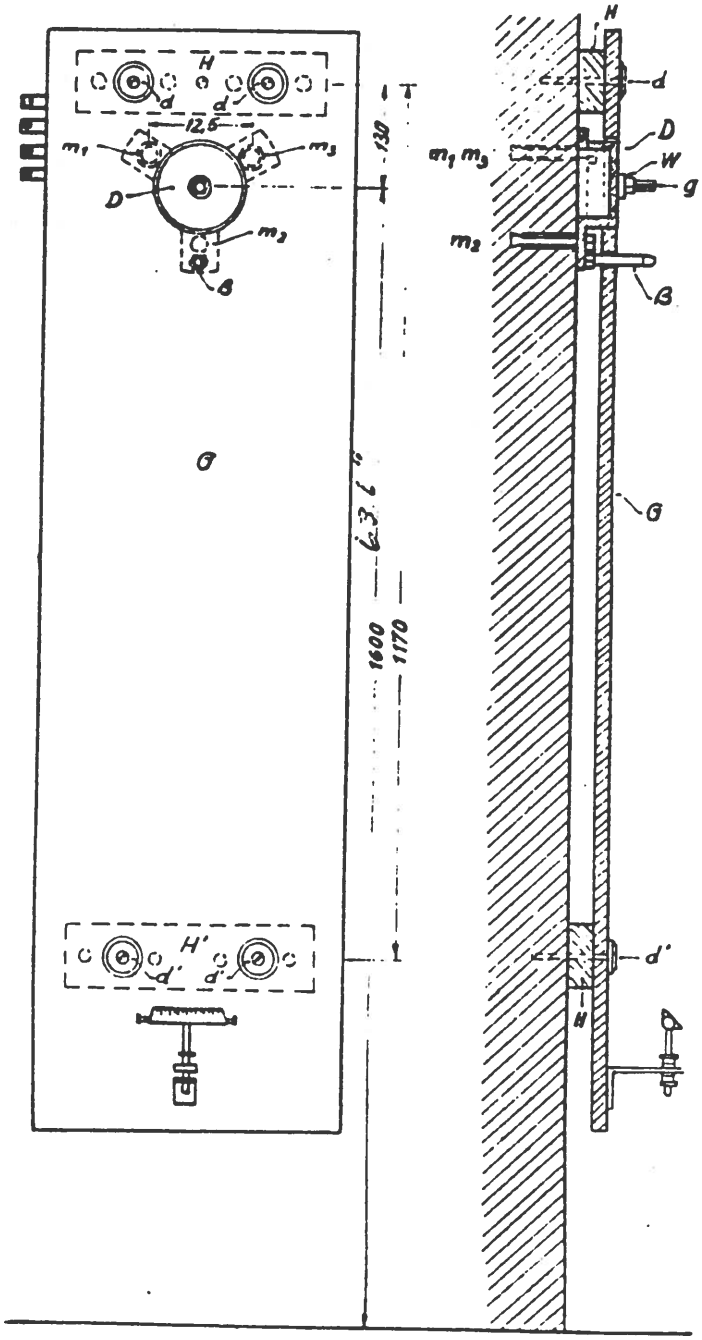

Fig. 1 M=1:10

Mounting instructions for Wall-plate and Clock-casing

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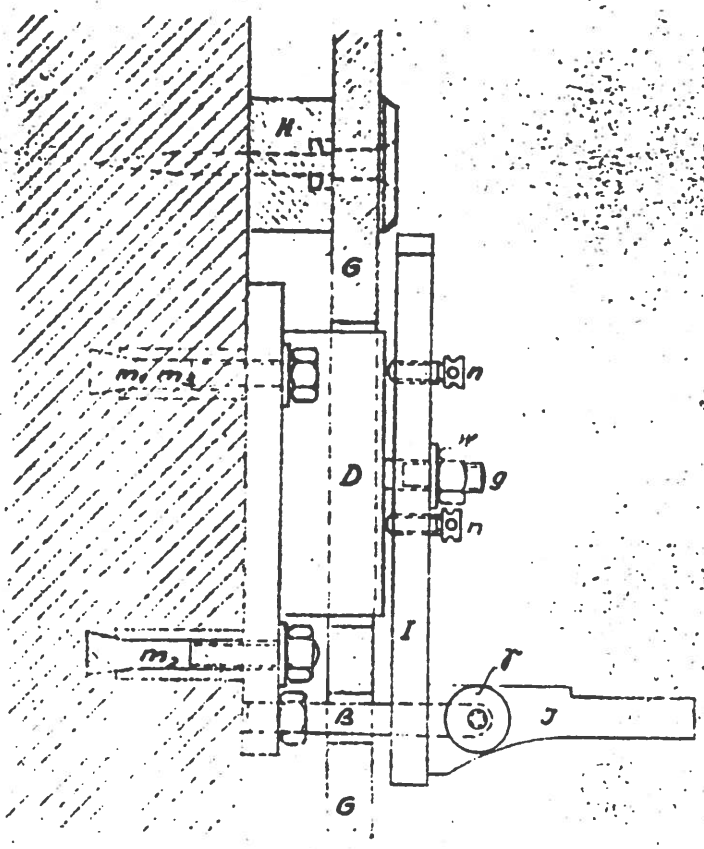

Fig. 2 M = 1:3

Mounting instructions

for Work-frame with Clock-work on the Wall-plate

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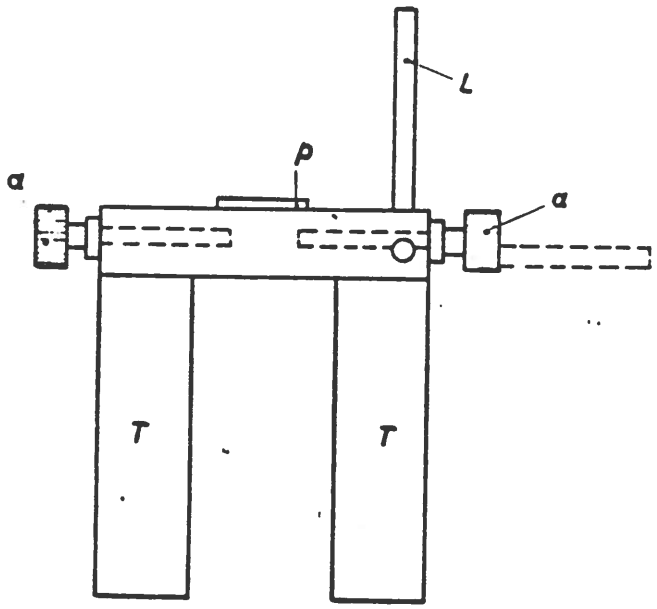

Fig. 3

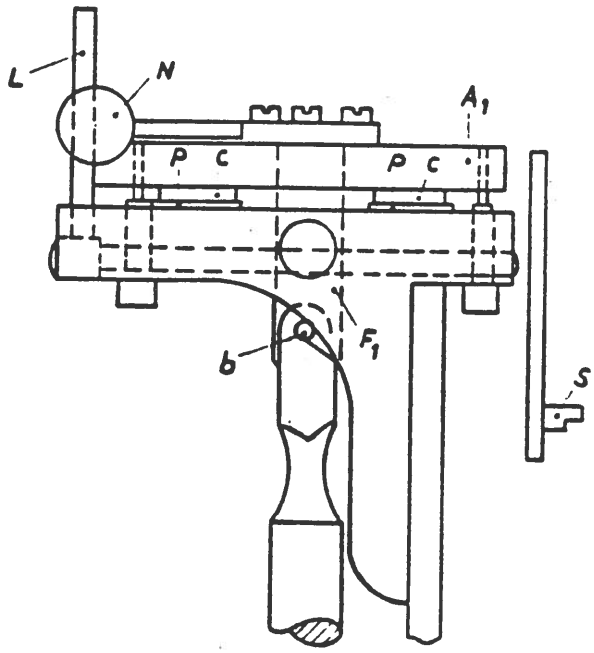

Fig. 4

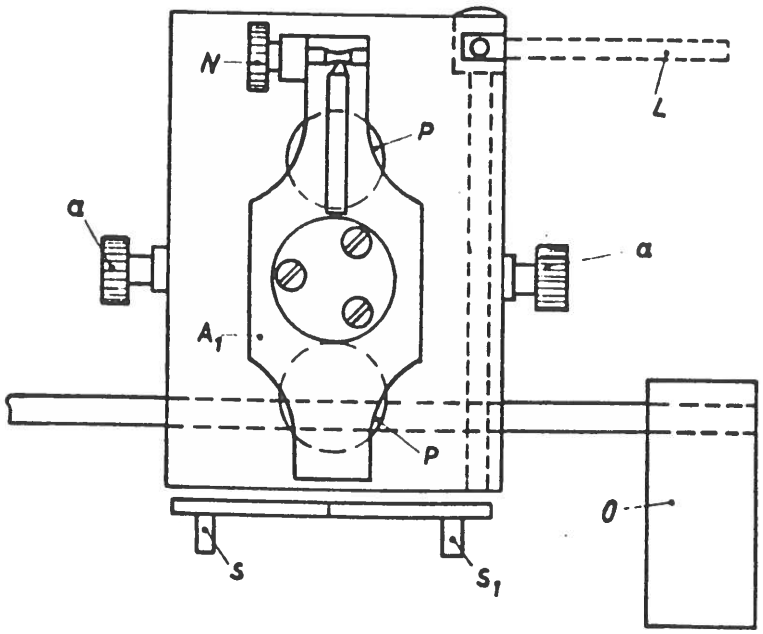

Fig. 5

Instructions for Pendulum suspension and adjustment

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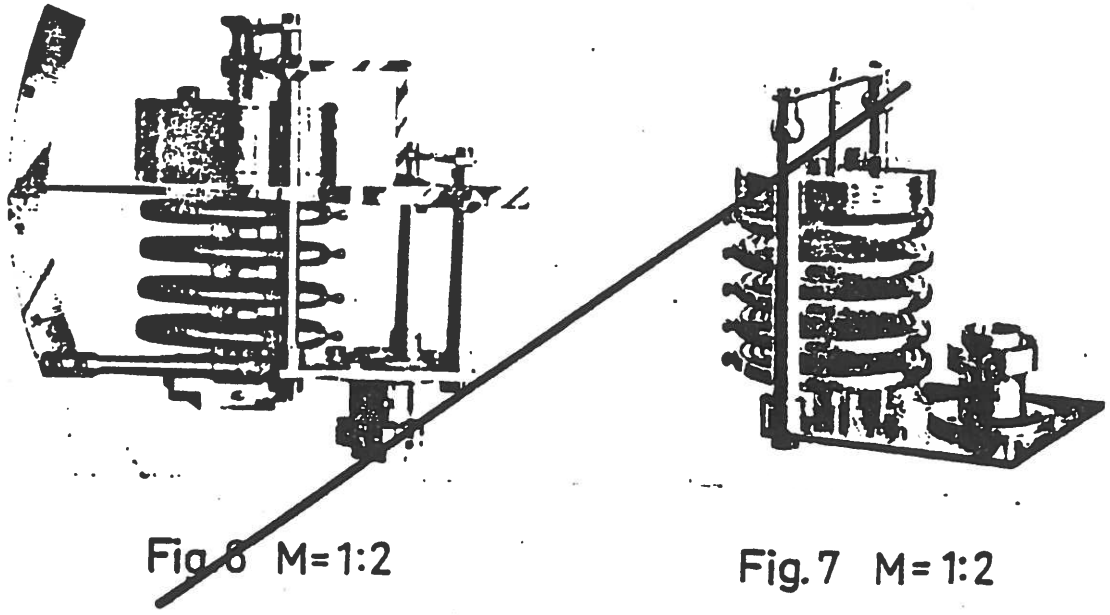

Fig. 6 M=1:2

Fig. 7 M=1:2

Air-pressure compensation

with and without lever transmission and pointer

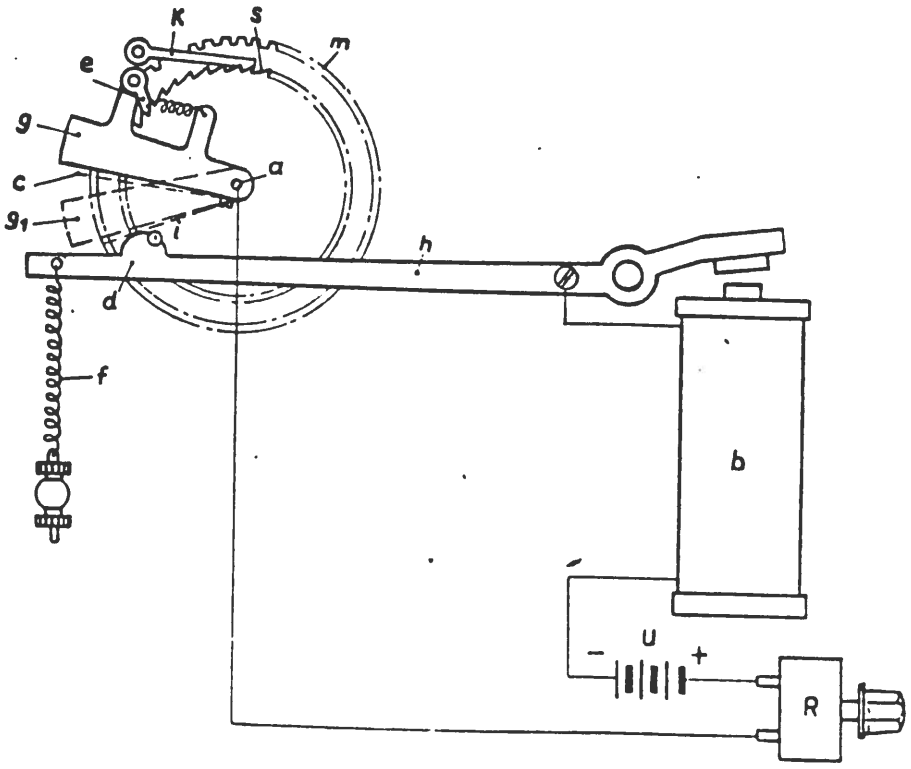

Fig. 8

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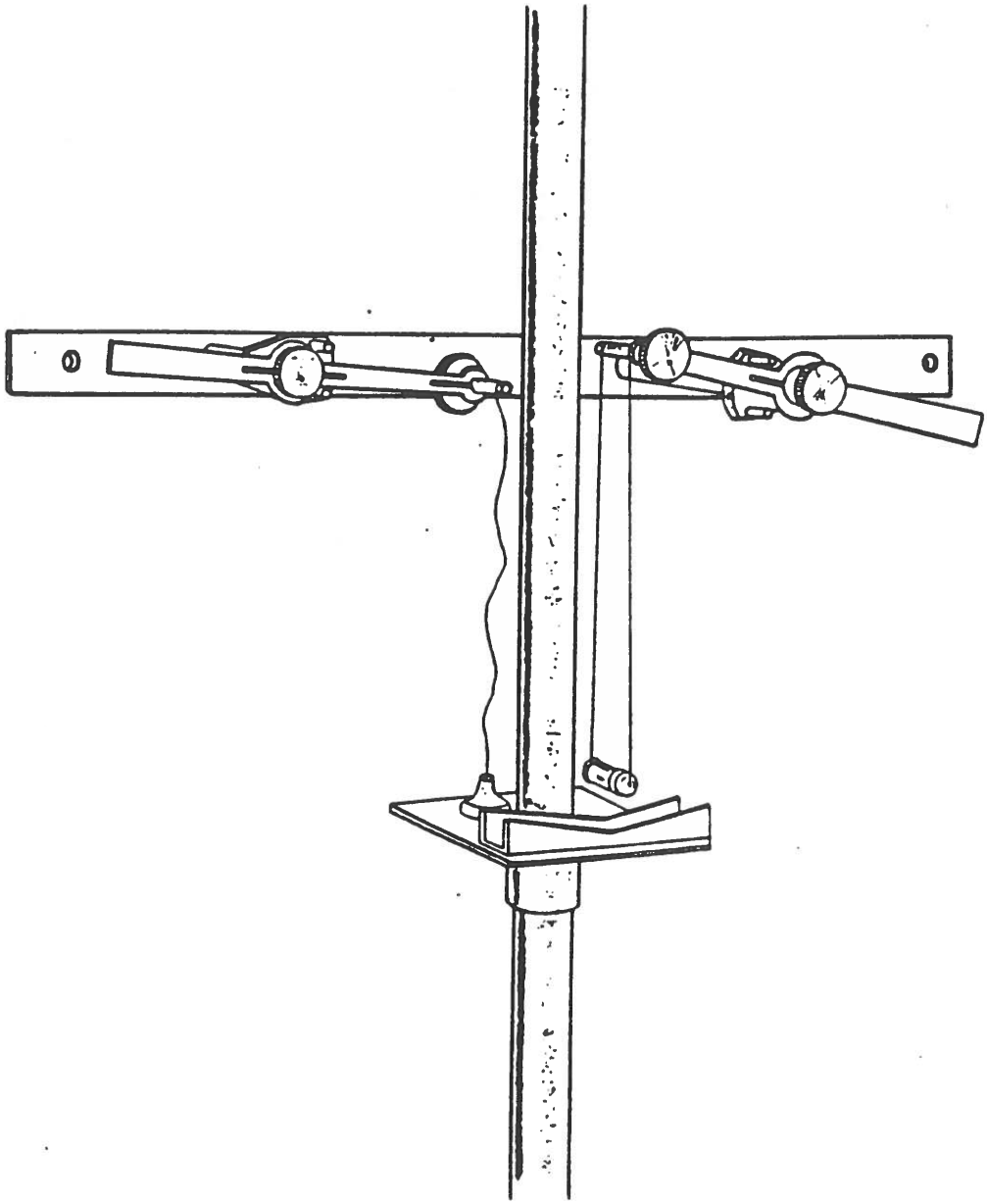


Fig. 9

Mechanical adjustment for correcting the clock-rate

First Supplement to the Treatise:

Präzisions-Pendeluhren und Zeitdienstanlagen für Sternwarten. Von Dr. S. Riefler.

(Theodor Ackermann, Bookseller to the Royal Court of Bavaria, 1907.)

The Working of Astronomical Time-Service Systems

by means of

Accumulators with Incandescent Lamp Rheostat.

By

Dr. S. Riefler.

Munich 1911.

Dr. C. Wolf and Son, Printers to the Royal Court and University.

The Working of Astronomical Time-Service Systems
by means of
Accumulators with Incandescent Lamp Rheostat.

By

Dr. S. Riefler, Munich.

The increasing use of electric lighting affords an equally increasing opportunity of using the conductors of the electric continuous current as the source of current for running electric apparatus in Time-Service Systems of observatories. As these apparatus require as a rule only a very small current amounting to less than 100 milli-amperes, the current of the electric lighting circuit will have to be reduced to the required figure by the employment of resistances.

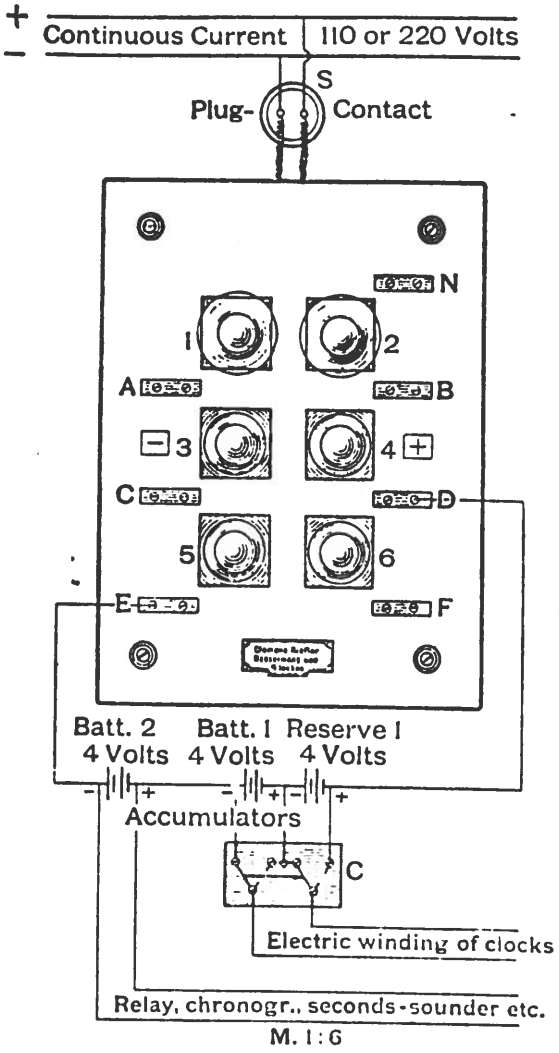
It would, however, not be possible to drive the apparatus, such as electric clocks, relays, chronographs, seconds dials, seconds sounders etc., with the thus reduced current, as the high pressure of the latter would be but slightly reduced by the resistances, and would destroy the electric contacts of the clocks, relays etc. Such direct running would neither afford the sufficient safety, as the apparatus would be dead during the interruptions frequently occuring in lighting circuits.

These two disadvantages render it advisable that direct running should not be resorted to, and are a reason for the adoption of accumulators.

These accumulators are charged with current derived from the lighting circuit, and will then provide the apparatus with the current required for operating them, and these will remain independent of temporary interruptions in the lighting circuit. As the pressure in each accumulator will amount to 2 volts, a service pressure of 4, 6, 8 etc. volts may easily be obtained by connecting several such cells in series. It may be here mentioned that for clocks and other apparatus for the Time-Service Systems generally a pressure of 4 volts will be sufficient, provided that the total resistance of the apparatus and their conductors do not exceed the use of a battery of a higher pressure.

With regard to the charging of the accumulators, I may point out that the continuous charging recommended in my treatise "Präzisions-Pendeluhren und

Zeitdienstanlagen für Sternwarten, München 1907" has proved very satisfactory in practice. The electrode plates of the accumulators showed no trace of change after several years service. Such continuous charging differs from the customary periodical charging method by the small current being sent uninterruptedly into the accumulators. The main advantages afforded by continuous charging, compared to periodical charging and particularly to service by means of dry or other cells, are the great uniformity of the current, simplicity of the attendance and the small running costs. **The reduction of the lighting current to the amperage required for charging the accumulators for operating the apparatus, is obtained by means of the incandescent lamp rheostat, manufactured by my firm. By means of a plug contact this rheostat can be connected in a very simple manner, the same as for a desk lamp, to the circuit of the electric continuous current system, and it admits originally of 6 variations of the current for charging and operating. It consists of 6 carbon filament lamps, Nr. 1 to 6 of different but given candle powers, which are arranged besides 7 terminals, *A* to *F* and *N* (terminal for fresh charging), on a panel of fire proof isolating material Fixit.** As with carbon filament lamps short circuiting cannot occur, these lamps are better suited as resistances than resistances made of metal wire.



Incandescent Lamp Rheostat.

The negative pole of the accumulator battery to be charged is connected on the left side of the panel, marked —, to one of the three terminals *A*, *C* or *E*, while the positive pole is connected to one of the four terminals on the right, marked +.

When introducing the plug into the contact box of the electric lighting circuit, attention should be paid that the poles of the rheostat or battery respectively coincide with the poles of the lighting circuit.

The terminals of the rheostat to which the battery should be connected, are determined by the amperage of the charging current to be obtained. This charging

current should be at least by 40% stronger than the service current which is to be derived from the accumulators. If the battery is connected to the terminals *A* and *N*, lamp 1 will be connected to the circuit. With the rheostat for a lighting current of 110 volts the candle power of this lamp must be 32 Hefner c. p., with a rheostat for 220 volts 50 Hefner c. p. The lamp will then allow a charging current of 970 or 780 milli-amperes respectively to flow through the battery. This current will suffice for the first charging of the apparatus in question.

If the poles of the apparatus are connected to the terminals *A* and *B*, lamps 1 and 2 are connected to the charging circuit, and the charging current in consequence will amount to 400 or 310 milli-amperes respectively. By connecting the poles to the various terminals, 3, 4, 5 or 6 lamps may be in the same manner connected in series, so that the charging current is reduced to 30 and the service current to 21 milli-amperes. By exchanging some of the lamps for others of different resistances (candle powers) further variations of the charging current may be obtained if necessary. The following tables I and II show the candle powers of the incandescent lamp rheostat for circuits of 110 or 220 volts respectively. They further show to which terminals the poles of the battery must be connected, in order to obtain the given charging and service current.

I. Incandescent Lamp Rheostat for a circuit of 110 volts.

Candle power of the Carbon Filament Lamps.

Lamp No.	1	2	3	4	5	6
Hefner C. P. / Volts	32 / 110	25 / 110	5 / 110	5 / 110	5 / 110	5 / 110

Charging and service current with the above lamps as resistances.

Connected lamp No.	Terminals	Charging current for	Charging current Milli-amperes	Service current Milli-amperes
1	A and N	Fresh charging	970	
1 + 2	A and B	Recharging	400	
1 + 2 + 3	B and C	Continuous charging	110	77
1 + 2 + 3 + 4	C and D	do.	60	42
1 + 2 + 3 + 4 + 5	D and E	do.	40	28
1 + 2 + 3 + 4 + 5 + 6	E and F	do.	30	21

4

II. Incandescent Lamp Rheostat for a circuit of 220 volts.

Candle power of the Carbon Filament Lamps.

Lamp No.	1	2	3	4	5	6
Hefner C. P. / Volts	50 / 220	50 / 220	10 / 220	10 / 220	10 / 220	10 / 220

Charging and service current with the above lamps as resistances.

Connected lamp No.	Terminals	Charging current		Service current Milli-amperes
		for	Milli-amperes	
1	A and N	Fresh charging	780	
1 + 2	A and B	Recharging	310	220
1 + 2 + 3	B and C	Continuous charging	100	70
1 + 2 + 3 + 4	C and D	do.	58	40
1 + 2 + 3 + 4 + 5	D and E	do.	40	28
1 + 2 + 3 + 4 + 5 + 6	E and F	do.	30	21

Determining the service current and charging current: As stated above, the charging current should be at least 40% stronger than the service current, that is to say, the total current which is required for operating all the apparatus connected to the respective battery. The method of calculating this current reduced to continuous emission may be found in the tables page 52 and 53 of my above mentioned treatise "Präzisions-Pendeluhren etc." In practice, however, it will be much more convenient to adjust the charging current by means of a voltmeter to the required strength. **The pressure at the terminals of the accumulators** should amount with a battery of 2 cells to a little more than 4 volts when all apparatus are in use. If this pressure sinks in course of time gradually to 3,8 volts, this will show that the battery is too weak, and the battery must therefore be connected to one terminal higher on the rheostat, whereby the resistance is reduced by the resistance of one lamp. As a rule, the charging current should be rather too strong than too weak. The pressure on the terminals of the battery of two cells should, however, by no means amount to more than 4,8 volts.

For the electric winding of clocks, a separate battery should always be provided, and it is not advisable to employ this for driving other apparatus. By no means should the chronograph be connected to this battery. As the current consumed by the chronograph is comparatively great, it may easily occur that, when it is working for several hours, the pressure in the battery differs very considerably. For a uniform running of the clocks, it is, however, of advantage if the pressure in the winding battery remains as constant as possible. Several clocks may be wound from the same battery. They should not be connected in series, but parallel, as this may be seen from the typical clock plants in my treatise "Präzisions-Pendeluhren etc." In the clock plant C in this treatise, the continuous charging method has been employed. The just described lamp rheostat has here been combined with the switchboard (page 65), and besides the accumulator battery for winding the clocks a **reserve battery** for the same purpose has been provided, consisting of dry cells. Practical experience has, however, shown, that there is hardly any need for a reserve battery. If it is, nevertheless, to be employed for reasons of greater safety, here also accumulators are preferable to dry cells. The reserve battery is connected to the charging circuit immediately behind the main battery, so that both batteries are always being **simultaneously** charged.

The current for winding the clock will, however, be mostly derived **alternately** from the battery 1 and the reserve battery. The switching necessary for this purpose is effected by means of the double switch C at regular intervals, say once a week. During this interval, the pressure of the connected battery will sink by about 0,1 volt, but then remain unchanged. The uniformity of the service current will therefore be very great and might be still further increased by more switching.

It will sometimes occur that the pressure of the two batteries will differ from each other by some tenths of a volt. In such a case the weekly switching will not be so advisable: It will then be better to employ the stronger of the batteries and to keep the weaker of the two batteries charged as a reserve in case of emergencies. This may be done without any danger to this battery.

For winding 1 to 3 clocks, the smallest current adjustable on the rheostat, when all six lamps are connected, will be sufficient. (Terminals E and F.) If more than three clocks are to be wound, one lamp must be disconnected. (Terminals D and E.) For operating the other apparatus such as relays, chronographs etc., always a special battery (2) should be employed, to be connected in series with the winding batteries to the same charging circuit. To this battery all apparatus (except the clock winding) may be connected, but if necessary, also further batteries besides 1 and 2 may be connected to the same charging circuit.

In this case the current in the charging circuit must be calculated for the battery from which the greatest current is to be derived. A small overcharging of the other batteries will be without disadvantages, as long as it does not exceed 4,8 volts. In this case the required service current will have to be produced by increasing the severely strained battery by one or two cells, whereby the pressure would be increased from 4 to 6 or 8 volts.

The first charging of the accumulators should be carried out according to the instructions given in the already mentioned treatise "Präzisions-Pendeluhren etc." page 67. These instructions are practically the same as those given by the manufacturers of accumulators with the batteries supplied by them. After the cells of the batteries connected in series for continuous charging have been filled with chemically pure sulphuric acid of a specific gravity of 1,18, charging should be immediately commenced. For this purpose the two terminal poles of the batteries connected in series are connected under due consideration of their denomination to the terminals *A* and *N* of the rheostat. By the thus connected lamp 1 which will glow with full intensity, the charging current is reduced to almost the **maximum amperage**, which for the batteries here in question is assigned by the accumulator works to be 1 ampere.

The charging must now be continued until **gas bubbles** begin to rise in the cells, or until the pressure in each of the two batteries consisting of two cells has reached 4,8 volts (thus per cell 2,4 volts), which will be the case in 20 to 30 hours, according to the number of cells to be charged at the same time, and according to the charging current (970 or 780 milli-amperes).

After the first charging has been completed, the batteries are connected to the terminals for continuous charging. In consequence of the slight current flowing through the lamps, these will not glow, or do so to a very slight extent only. The consumption of current is therefore so small that the cost of a service with accumulators with continuous charging is much smaller than if any other source of current were used.

The recharging of a battery, the pressure of which has fallen for some reason or other, is effected in the same manner as the fresh charging or by connecting lamps 1 and 2. (Terminals *A* and *B*.)

As a charging current of an amperage lower than the maximum is admissible, fresh charging can also be carried out by connecting lamps 1 and 2, but will then require a considerably longer time.

The maintainance and attendance of the accumulator batteries being continuously charged is very simple:

When it has been found by repeated tests with the **voltmeter** on each individual battery being charged, that the increase of the pressure at the terminals of each battery has been completed, it may be assumed that the accumulators are connected to the proper terminals of the lamp rheostat, and the pressure between the terminals will then amount to 4 to 4,8 volts. All further attendance of the batteries is limited to simply refilling the accumulator cells from time to time with sulphuric acid.

The refilling of the electrolyte is generally required once every 6 to 8 months. The electrode plates should always be completely covered with the fluid. The latter evaporates the quicker, the stronger the charging current.

It is advisable to measure the pressure in the batteries even when the condition of charge in the batteries has for some time been permanent, as this will

allow of controlling whether the circuit system is still intact or if short circuiting has occured in consequence of some defect.

For charging accumulators only a **continuous current** can be employed. If only an alternating current (rotary, multiple phase current) is available, such alternating current must be converted into a continuous current by means of a **rectifier.**

Last of all it may be mentioned that the incandescent lamp rheostat here described may be employed not only for the apparatus of time-service systems, but also for other low pressure apparatus.

The "Typische Uhren-Anlage C" in my treatise "Präzisions-Pendeluhren und Zeitdienstanlagen für Sternwarten, München 1907" and the second supplement to this treatise "The Time-Service System at the Provisional Observatory of the German Museum in Munich", which contains a description of the Typical Clock Plant E, show how the clocks and apparatus should be connected in time-service systems to the accumulator batteries.

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THE JOURNAL OF THE ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78
NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

VOLUME XXIII #4, DECEMBER 1997

Fellow Horologists:

This issue is very late in arriving because our President and Editor, Martin Swetsky, is no longer able to function in these capacities. Dr. George Feinstein and myself, for now will try to continue to publish the Journal. We had delayed publication hoping that Martin would recover enough to resume his duties, but apparently, it is not to be in the foreseeable future.

Annual dues is due. For now the dues are still $10.

One of the things that had been under discussion was an increase in the dues from $10 to $15. Increases in printing and postage costs have made our present dues structure marginal. Each 24 page issue costs over $2.50 to print and mail. It doesn't take any great math to see the problem. For the time we have been able to carry on from past surplus and sale of back issues, but the money is running out. A possible alternative to the increase would be a reduction in the number of issues from four 24 page issues to three 24 page issues per year. On the dues notice there is a box to show your preference, please check off your choice, increasing the dues to $15 and maintaining the four issues, or remaining at $10 but decreasing to three 24 page issues per year. **If you fail to check off a preference it will be counted as a vote for the increase to $15.**

This is the time of the annual clearing out of the mart ads. If your ad has been in for more than two issues please let us know if you want to keep the mart ad going, otherwise the ad will be removed in the next issue. A fresh belated start for 1998. We expect to issue the next journal by early June.

A Spring meeting of Chapter 78 will be held at the home of Drs. Bruce and Maxine Levy. The meeting will be on Saturday, May 16, 1998, starting at noon. Bring items for a show and tell. Please call the Levys at (516) 433-6836 to let them know who is coming and to get directions to get to their abode. There will be a short business meeting.

Reprints of complete back issues of the Journal are $4.00 each plus postage. Copies of articles from the Journal are $0.25 per page, again don't forget the postage. Get in touch with Dr. George Feinstein for this service.

Continued on page 24.

TELECHRON SEALED ROTORS

OCTOBER 1997 J. R. Seeley

This is a dissertation on the sealed motors of the "B" and "H" types, to give a little insight into their workings. Also some hints as to their possible repair.

THE "B" TYPES

Occasionally one encounters an odd unit, as I did with my STR clock. It uses a rotor of 1 RPM at 50 Hz., (but running on 60 Hz.), which makes it rotate one revolution in 50 seconds. The reason for this is to keep the spring in the clock wound fully at all times. After a power failure it will "catch up" again.

All of these units have one thing in common, they are two-pole induction motors, rotating at 3600 RPM. (at 60 Hz.). The gearing is set up to divide by 3600 to get 1 RPM. out.

Disassembly of a number of these units showed several other things in common, even between the "B3" type and the "BF" types. The main internal gearing is always the same, with the output of the internal sub-assembly being 1/1000 of the armature speed, (3.6 RPM at 60 Hz.). Since the sub-assembly has an output pinion of 10 leaves, mating with a gear of 36 teeth on the output shaft, this results in the required one RPM. The only changes necessary for the 50 Hz. units is to decrease the output shaft wheel to 30 teeth, and to increase the sub-assembly pinion diameter to accomodate the new pitch. Train counts and calculations will follow at the end of this article.

There were several variations noted between units. One very important one is the material of the pivot plates. Three different materials were seen, copper, phenolic, and some kind of paper or fiber board. The end plates could be aluminum, brass or copper. The main variation between the B3 and the BF sub assemblies is the length of the armature shaft and the number of rotor discs on it. The B3's often have four discs, the BF's no more than two, therefore the shaft lengths vary, as well as the outer case size. The steel discs are usually around 10 to 11 thousandths of an inch thick and are sometimes magnetized. More on this later.

In one B3, all wheels were of brass, in all others the first three were of phenolic, probably for quiet operation.

METHOD OF DISASSEMBLY

Disassembly involves chucking the unit in a lathe and machining away a little of the outer case down to the solder underneath. A little persuasion can then separate the two. (Watch out for the oil!). **Do not** try to melt the solder, the heat will cause the oil to vaporize and the case to explode with fire!!! Also it appears that the final assembly was a press fit, not depending on the solder to hold it together. The solder was mainly used to seal the oil inside.

Removal of the sub-assembly from the case involves drilling through the three dents made in the case to stake the sub assembly in place so it cannot move. A # 48 drill bit works nicely. Subsequent rapping of the open end on a steel block, (with a hole to prevent damage to the pinion), will release things to where separation occurs.

At this point determination of the cause of failure may be made, usually wear of the pivot holes for the third or fourth wheel. Complete loss of oil is also a contributor. No serious damage was seen to wheels or pinions, except one unit that was very badly worn, with about half of each tooth of the second and third wheels were worn away. Also the pivot holes for the fourth wheel were worn almost the diameter of the pivot. In some cases the only problem was that the oil had dried up to a thick consistency preventing the high-speed armature from coming up to speed. Wear in many of these units was minimal, most parts being reusable.

Separation of the sub-assembly plates involves removing the staked area of the posts with a drill bit in a hand chuck. This is on the "front" plate with the output pinion. The rotor discs are friction fit on the armature shaft or pivot, and are indented so as to automatically be centered. The output pinion is a tapered fit on the output pivot, and can be removed with a pin punch and hammer.

Once everything is separated, a good cleaning helps to see and analyze everything.

RE-ASSEMBLY

First a word about the rotor or armature discs. These may be magnetized, in three different configurations. The most common being approximately 30 degrees away from the two central bars, although some showed their poles to be in line with the center bars. Strength ran about 25 to 30 gauss, or more, measured with an REL Gaussmeter 904. Some discs showed almost no permanent magnetism at all. It seemed logical at this point, that when assembly takes place, similar discs be used, and carefully oriented so their magnetic poles coincide. However, this is not the case. Discs that were completely demagnetized before assembly and then were "test run" were found to be quite heavily magnetized if they were rotating when current to the coil was interrupted. To make sure that there is no interference in a re-assembled motor, it appears advantageous to demagnetize all the discs and orient them so that the center bars are in line.

The first step in reassembing is to get all the wheels back into the sub-assembly. It will be held together with a little epoxy in the area of the staking removed in dis-assembly. When cured and solid, the rotor discs can be installed.

This is the second step in re-assembly. Four short pieces of 1/4" aluminum stock with holes drilled at different depths are used to "set" the discs back on the shaft. The sub-assembly output pinion is then installed on its shaft and a trial run made. All being OK, the assembly is reinstalled in the housing. An epoxy-steel product sold under the name "J B Weld" is used to fill the holes drilled in the housing and a little extra between the assembly and the housing on the inside to make sure nothing can move.

After the recommended curing time the end plate with the output shaft can be epoxied in place. An estimate of the amount of oil seems to be around ten drops of a light grade of clock oil. To ensure good adhesion make sure there is no oil on the parts by wiping with acetone or lacquer thinner. A caliper can be used to set the assembly at about 0.90" overall front to back. This seems to be a good average, giving a "press fit" plus necesary end-shake for the output shaft. Keep all oil away from uncured epoxy.

"H" Units

NOT TO BE CONFUSED WITH THE SMALLER "S" MODEL

Turning now to the "H" models, which mostly are of the 3.6 RPM. variety, the same basic wheel count holds, except for the last wheel-pinion pair. Instead of a 12 : 48 ratio, it becomes 10 : 40, maintaining the 4 : 1 ratio. Also the size of these parts is increased for longer life. As a matter of fact, the first three wheels are interchangeable with the "B" series. Note the pivot plates are not interchangeable because of their diameter, among other things.

The seal between the main housing and the front plate is again a press fit, followed by a staking operation to form the case into a groove in the front plate. The oil seal is accomplished with a lacquer based paint applied to the inside of the housing. It seems that this was not too successful, as almost all of these units were bone dry when opened. Disassembly of these units is quite similar to the "H" units, except that there is no solder used, and the assembly is not staked into the case. This is not necessary since the "front plate" is directly in contact with the assembly, and the output shaft bushing extends into the assembly in a close-fitting hole.

After machining away some of the case, the assembly can be pried out using a case knife. Separation of the plates is the same as the "B" series. Determination of the reason for failure and correction of it can now take place after a good cleaning. Reassembly can be done following the same procedure as above.

CONCLUSION

Many thousands of these were made over the years and were used in many different ways. When an exact replacement is needed to keep authenticity of a "collectable", repair may be the only alternative. Some models of Telechron "rotors" or "motors" (as you will) are still available, from vendors of horological or appliance parts.

The decision to modify a choice piece to use a different motor, or to attempt repair of the existing dead one, must be made by the individual. All possibilities must be carefully considered, from expertise to tooling. This article should give a little insight to the work involved.

TELECHRON SEALED MOTORS

GEAR TRAIN CALCULATIONS

Rotor Speed			**Ratio**	**3600.**	**rpm**
First wheel / Rotor pinion	50 / 12	=	4.1666---	864.	rpm
2nd wheel / 1st. " pinion	54 / 12	=	4.150	192.	rpm
3rd Wheel / 2nd " pinion	50 / 15	=	3.333---	57.60	rpm
4th wheel / 3rd " pinion	48 / 12	=	4.	14.4	rpm
5th wheel / 4th " pinion	48 / 12	=	4.	3.60	rpm
Output wheel / 5th " Pinion	36 / 10	=	3.6	**1.000**	**rpm**

Verification:

$$\frac{3600 \times 12}{50} = 864 \qquad \frac{864 \times 12}{54} = 192$$

$$\frac{192 \times 15}{50} = 57.60 \qquad \frac{57.60 \times 12}{48} = 14.40$$

$$\frac{14.4 \times 12}{48} = 3.60 \qquad \frac{3.60 \times 10}{36} = 1.000$$

Second Supplement to the Treatise:

Präzisions-Pendeluhren und Zeitdienstanlagen für Sternwarten. Von Dr. S. Riefler.

(Theodor Ackermann, Bookseller to the Royal Court of Bavaria, 1907.)

The Time-Service System at the Provisional Observatory of the German Museum in Munich.

By

Dr. S. Riefler.

Munich 1911.

Dr. C. Wolf and Son, Printers to the Royal Court and University.

The Time-Service System at the Provisional Observatory of the German Museum in Munich.

By

Dr. S. Riefler, Munich.

On December 22nd 1910 an observatory for instructive and demonstration purposes was opened at the German Museum of Masterpieces of Natural Sciences and Engineering in Munich. Until the new premises, which are being erected for the museum, are completed, the observatory has been installed on the roof of the former National Museum in the Maximilianstrasse, in which part of the large collections of the museum have been stored since 1905.

The Time-Service plant of this observatory equipped by my firm shows some differences compared with the typical clock plants A to D described in my treatise: "Präzisions-Pendeluhren und Zeitdienstanlagen für Sternwarten, München 1907". These differences were caused by the local conditions and shall be here described and illustrated.

This clock plant consists of one **standard clock**, two **seconds dials** and a **chronograph with two keys.**

As recording clock for the chronograph the standard clock is employed, the seconds contact of which is not connected as usual to a relay, but directly to the chronograph.

The use of a relay could here be dispensed with, as the chronograph and in consequence the seconds contact of the clock are here not so severely strained as in the regular service of an observatory. There a relay is employed as intermediate member for the purpose of saving the clock contact, as it requires a current of 12—14 milli-amperes only, while a chronograph would require a current of 30—50 milli-amperes.

In place of the secondary clocks synchronized from the standard clock, otherwise employed with the meridional instrument and the refractor, the two above mentioned seconds dials had to be employed, as it was impossible to erect pendulum clocks sufficiently steadily in the two huts made of reinforced concrete in which the meridional circle and the refractor are arranged.

Seconds dials do otherwise indeed not afford as great an accuracy as synchronized pendulum clocks. But here seconds dials of a new design were employed, which my firm has for some time constructed according to my instructions. These apparatus require a current of 8—10 milli-amperes only (compared to 25 milli-amperes required by those otherwise used). and they therefore afford a greater safety, which has during the short period of existence of the observatory proved in so far satisfactory, as no irregularities whatever were observed in the service even during the coldest days of the last winter (at — 16° in the rooms of these dials).

As the seconds dials are intended to indicate sidereal time they could not be connected to the clock plant which my firm erected in 1905 in the Astronomical Hall of the museum. The clocks of this plant, which are described in my treatise: "Präzisions-Pendeluhren und Zeitdienstanlagen für Sternwarten, München 1907", indicate central European time and serve in many instances as standards for comparing and controlling clocks, as they show always the correct time with an accuracy of $\pm$ 0,2 seconds. From here also the standard clock of the laboratory of the municipal electric central station is synchronized.

There is indeed in the Astronomical Hall a clock showing sidereal time, but this clock, which I constructed for the International Exhibition Paris 1900, has a decimal dial graduation and could thus not be used for this purpose.

Therefore a separate standard clock showing sidereal time for the observatory was erected in the Mathematics Hall of the museum, and the seconds dials and the chronograph were connected to it.

This **standard clock** is fitted with my free escapement, with nickel-steel compensation pendulum, electric winding, electric one second contact for recording on the chronograph with interruption at the "0" second, and with pole changing contact for operating the seconds dials.

The **electric working** of this time-service plant is arranged entirely according to the instructions given by my treatise: "The Working of Astronomical Time-Service Systems by means of Accumulators with Incandescent Lamp Rheostat, Munich 1911". The **incandescent lamp rheostat** there described for fresh and continuous charging of accumulators was erected in the Mathematics Hall close to the standard clock and is connected by means of its plug contact with the lighting system of the museum (continuous current of 110 volts).

To the terminals E and D of the incandescent lamp rheostat are connected the two pole ends of the **four accumulator batteries 1—4** connected in series, each of which has a pressure of 4 volts. In this way a charging current of 40 milli-amperes is continuously sent through the batteries.

The **battery 1** (see table) supplies the current for the **electric winding of the standard clock.** The current is so regulated by the rheostat R_1 that the weight lever of the clock is wound at intervals of 32—36 seconds.

The **battery 2** serves for operating the **chronograph** and **two keys** (on the meridional circle and on the refractor).

The current in the chronograph circuit is adjusted by the slide rheostat R_2, the resistance of which can be varied from 0 to 50 ohms. As the resistance of the electro-magnet of the chronograph is 50 ohms, the current will be, when R_2 is set at a resistance of 0 ohm $\frac{4}{50+0} = 0{,}08$ amperes $= 80$ milli-amperes, and if a resistance of 50 ohms is employed $= 40$ milli-amperes. The chronograph current may thus be regulated by means of R_2 to any amperage between 40 and 80 milli-amperes.

If the antagonistic spring on the magnet armature of the chronograph is adjusted for a given amperage and pressure, it will not be necessary to unscrew it under changed conditions, as the magnet armature may be made to act uniformly by means of the rheostat R_2.

The **batteries 3 and 4** serve to operate **the seconds dials** which are arranged for pole changing contact. They form together a double battery with common central conductor.

By the pole changing contact of the standard clock, the operation of which is evident from fig. 1, the circuits of batteries 3 and 4 are alternately closed for one second each. In the common central conductor, to which both seconds dials and the coil rheostat R_3 are connected in series, the direction of the current will therefore change every second.

The seconds dials, the essential improvement of which consists in their being fitted with a rotary armature with two electro-magnets opposite to each other, whereby extraordinarily favourable conditions are obtained for the pin friction, have a resistance of 200 ohms each. As another resistance of 100 ohms is connected by means of the rheostat R_3, a current of $\frac{4{,}3}{200+200+100} = 0{,}0086$ amperes $= 8{,}6$ milli-amperes will be the result for the service of the seconds dials at a terminal pressure of 4,3 volts of each of the batteries.

The series resistance of 100 ohms of the rheostat R_3 is not absolutely necessary, as the stronger service current of 10,75 milli-amperes, which would result if R_3 were omitted, would not do any harm to the seconds dials. The rheostat was provided for affording a possibility of substituting the resistance (200 ohms) of a seconds dial by a series resistance, in case the seconds dial had to be cut out.

By the **double switch** C the circuits of the chronograph and the two keys can be interrupted, when these apparatus are to be set idle.

For suppressing the sparking, **condensators** are provided at the electric contacts of the standard clock on the inside of the back of the clock case and are connected parallel to the respective circuit breakers. The use of condensators was here considered necessary in consequence of the strong self induction of the electro-magnets of the seconds dials (four electro-magnets with together 400 ohms resistance). For the electric winding of the clock and the seconds contact they were employed merely for reason of uniformity. They might as well have been replaced by spark preventing coils or polarisation cells, which would under the present

conditions have as favourable effects as the condensators, as it has been shown by the researches made with the oscillograph (cfr. Elektrotechnische Zeitschrift 1910, No. 34: Dr. S. Riefler & C. Paulus: „Die Mittel zur Beseitigung des Öffnungsfunkens beim Ausschalten von Elektromagneten").

On the right of the dial centre is arranged the condensator for the electric winding of the clock, on the left the condensator for the seconds contact and the

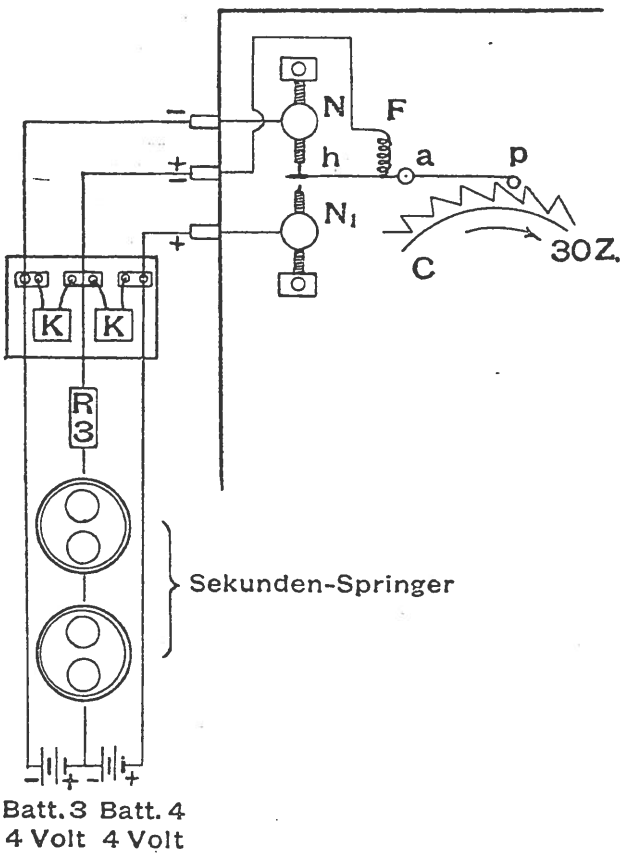


Fig. 1.
Pole changing contact with condensators, seconds dials and batteries.

two condensators for the pole changing contact, in which two contact points are provided.

The condensators are (the same as the spark preventing coils and the polarisation cells) connected parallel to the circuit breaker, viz. the spark gap, as is evident from fig. 1 and fig. 2. In fig. 2 W is the condensator (spark preventing coil or polarisation cell) and h is the circuit breaker, viz. the contact lever of the clock, and in fig. 1 K and K are the two condensators of the pole changing contact. Here these are shown not at the back of the clock case, as it would be the case in reality, but outside of the clock on a small shelf, what is generally done with my

hermetically sealed clocks. On the winding contact, here mostly three polarisation cells connected in series are employed, which are arranged between the dial and the front plate of the clock work.

The clock plant of the German Museum here described represents by its simplicity and its clear arrangement, and particularly by the mentioned incandes-

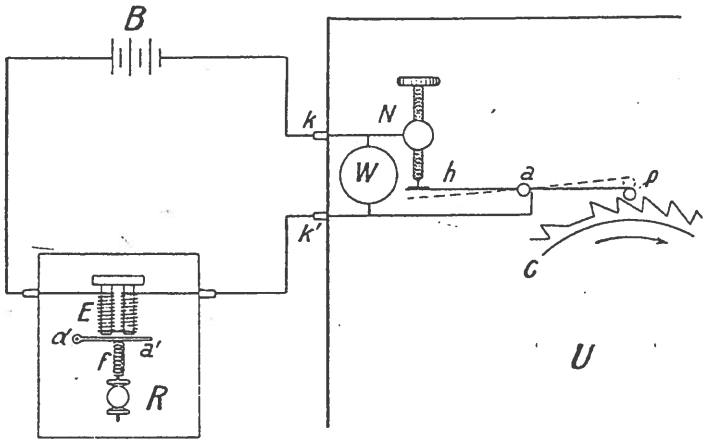


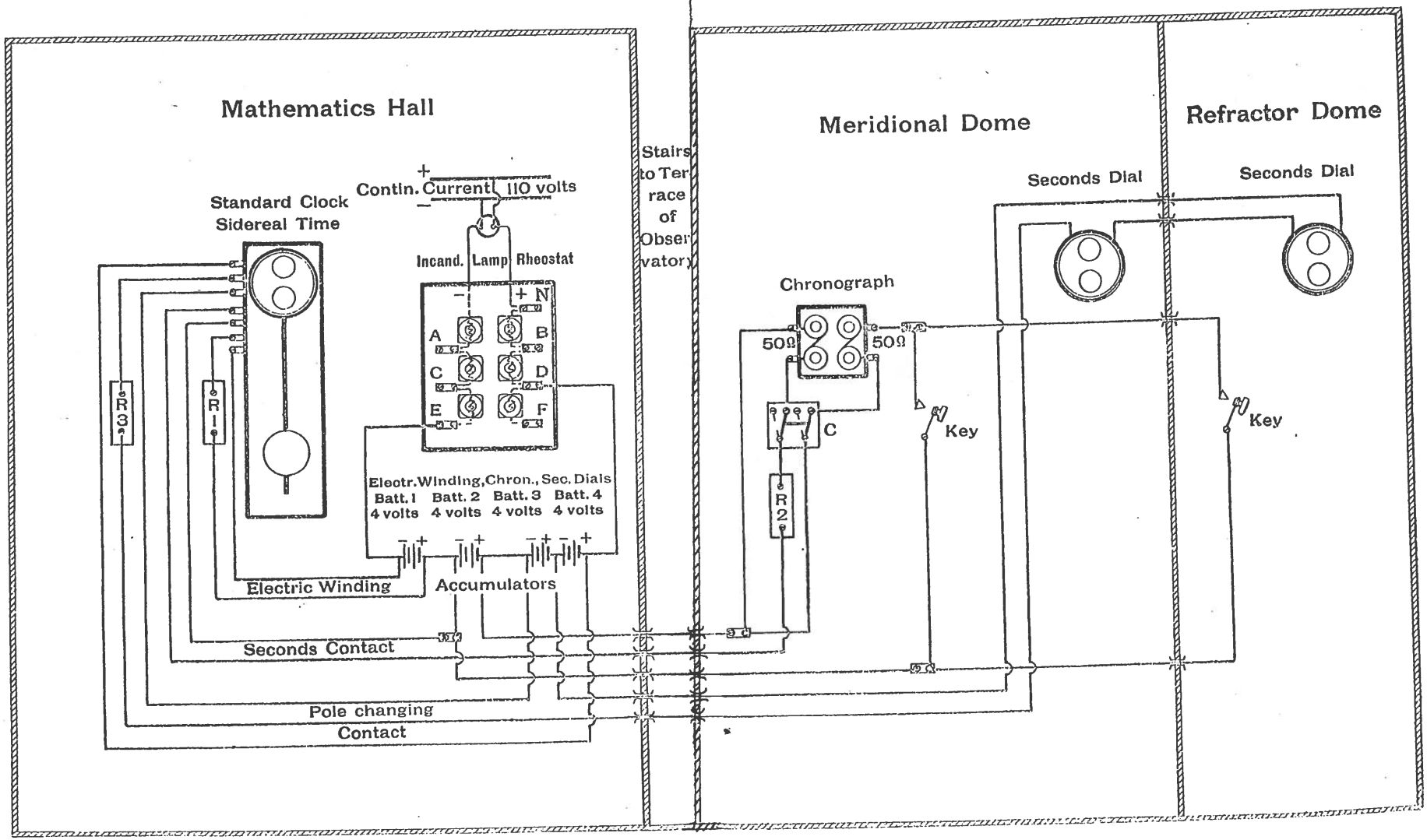
Fig. 2.
Seconds contact with condensator.

cent lamp rheostat a new modification of the typical clock plants A to D described in my treatise "Präzisions-Pendeluhren und Zeitdienstanlagen für Sternwarten, München 1907", and thus is a supplementary pattern which I have termed as type E.

TYPICAL CLOCK PLANT E.

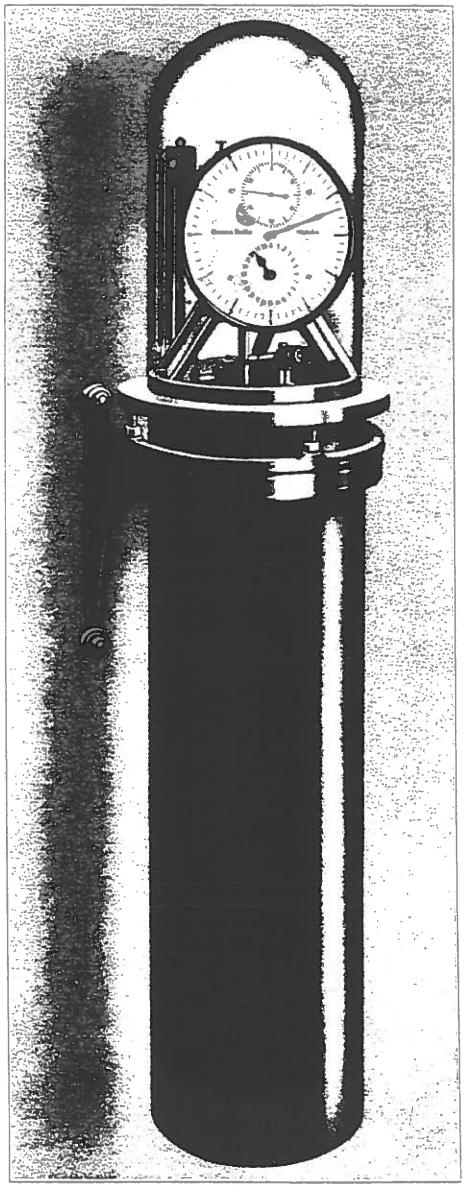
The Time-Service System at the Provisional Observatory of the German Museum in Munich.

The standard clock serves as recording clock for chronograph and for operating 2 seconds dials. The electric working is effected by accumulators continuously charged by means of incandescent lamp rheostat connected to the electric lighting system.



Präzisions-Sekunden-Pendeluhren

Precision Seconds-Pendulum-Clocks



Type D

Nr. 101 Type D **Astronomische Präzisions-Pendeluhr** unter luftdichtem Verschluß (Metallcylinder mit Glasglocke), mit Schwerkraft-Hemmung, Nickelstahl-Kompensationspendel Type J 1 sch mit Kompensation der Temperatur und ihrer Schichtungen, elektrischem Aufzug, elektrischem Sekundenkontakt, Mikroskop, Barometer, Thermometer, Luftpumpe, 3 Trockenelementen und Schieberwiderstand für den elektrischen Aufzug
mittl. tägliche Gangvariation: 0,01 - 0,03 Sekunden

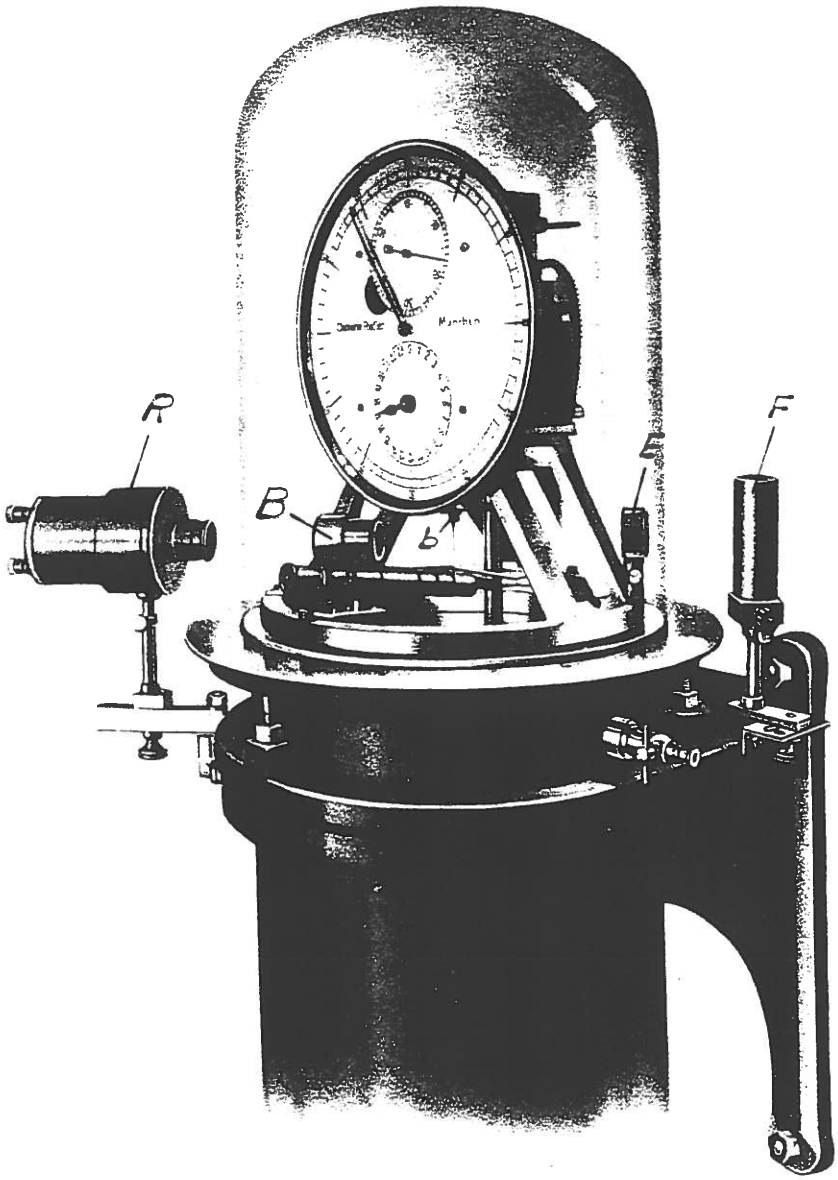
Zusatzeinrichtungen:

Elektrische Lichtkontakteinrichtung
bestehend aus: Photozelle – Beleuchtung – Verstärker. Genauigkeit: ± 0.001 Sekunde

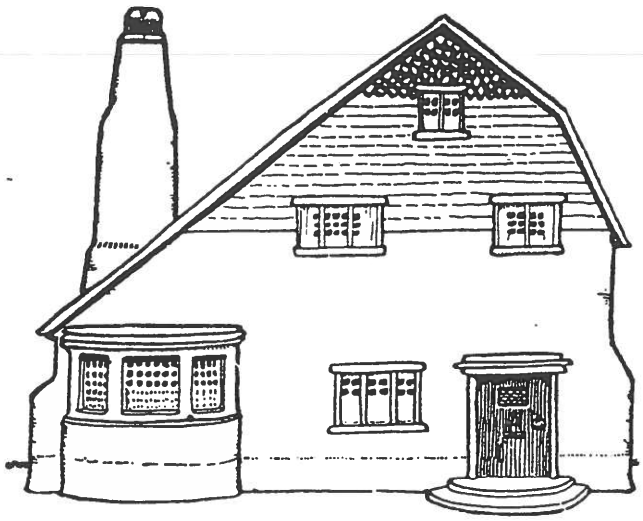
Nr. 101 Type D **Astronomical precision seconds-pendulum clock** in air-tight case (metal cylinder with glass cover) with gravity escapement, nickel-steel compensation pendulum Type J 1 sch compensating the effects of variations and stratifications of temperature, electric winding, electric seconds-contact, microscope, barometer thermometer, air-pump, 3 dry elements and sliding rheostat for the electric winding
Daily variation of rate of the clock type D: 0.01 - 0.03 seconds

Additional equipment:

Photo-electric contact-device
for time-recording consisting of: photo-electric cell – lamp – amplifier. Accuracy of measurement: ± 0.001 second.

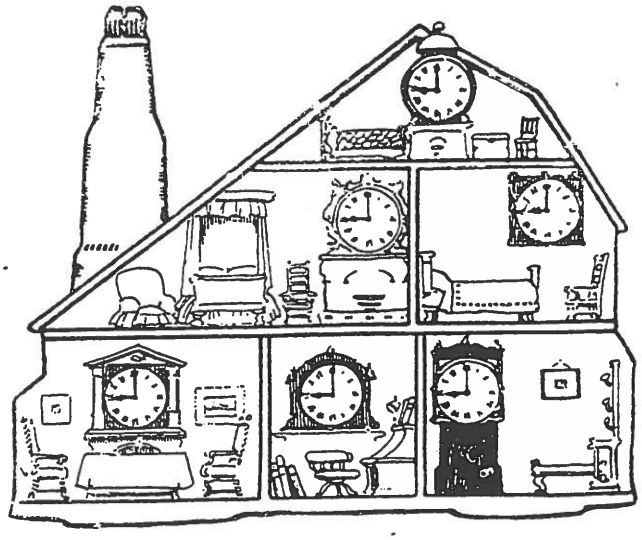


Type D
mit elektrischer Lichtkontakteinrichtung
with Photo-electric contact-device for time-recording



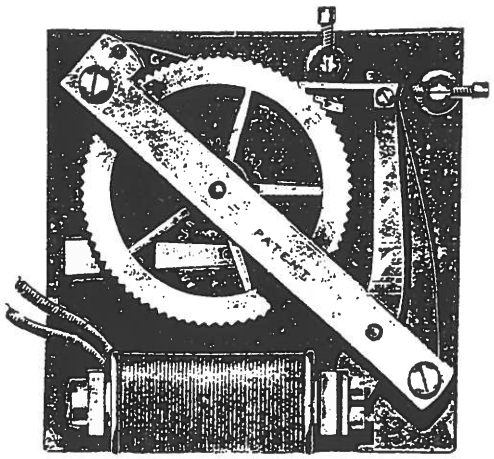
THIS IS THE HOUSE
THAT JACK BUILT

"After three years' experience of the Synchronome Electric Time Service we can confidently recommend the system for any establishment containing a number of departments working to time one with another."—*The Brisbane Newspaper Co. Ltd.*



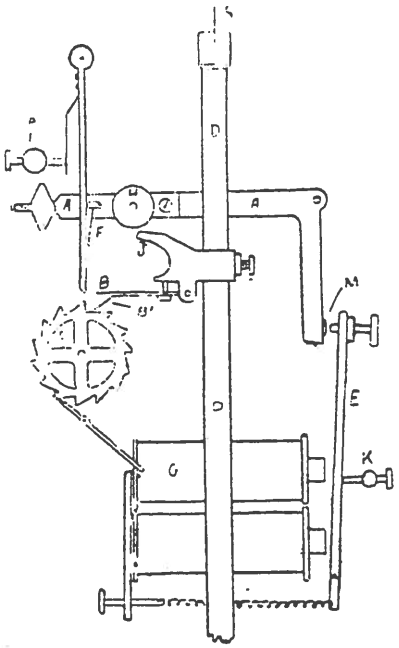
This is the TIME
That's uniform
All over the House
That Jack Built

"The Synchronome clocks installed some four years ago have worked to our entire satisfaction, the chief benefits being the uniform and correct time throughout all departments, which is most necessary to us."—*Watson & Ferguson Co. Ltd.*



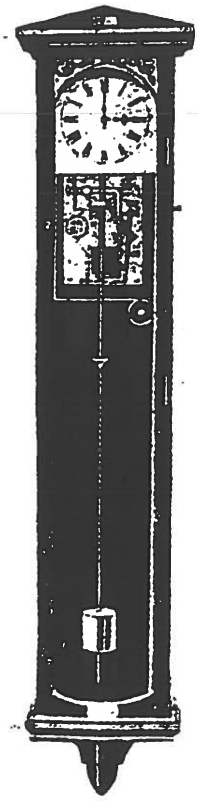
This is the WHEEL
Behind each face
That drives the hands
Half-minute's space
Which show the Time
That's uniform
All over the House
That Jack Built

'We have pleasure in stating that we have timed the 'Tower Clock' of the South Brisbane Municipal Council with the 'Time Ball' since its erection, some four months ago, and have not noticed any variation in that time. We were particularly interested in watching it, as it is in such an exposed position, and there were many very severe storms of wind and rain during that time. We can only add, that it is a boon to the public both day and night."—*South Brisbane Fire Brigade Board.*



This is the SWITCH
Called "Synchronome"
That tells the wheels
Behind each face
To move the hands
Half-minute's space
Which show the Time
That's uniform
All over the House
That Jack Built

"These clocks have arrived safely, and are working, so far, very well."—*Western Australian Government Railways.*



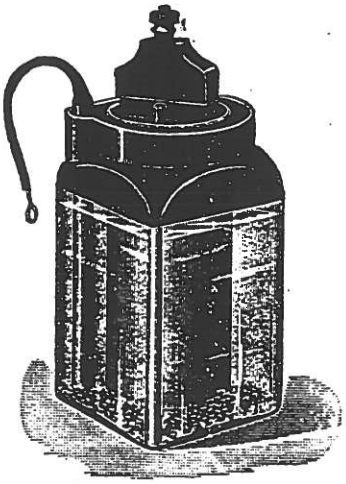
"During the five years they have been installed at our works they have given us every satisfaction."—*W. T. Glover & Co. Ltd., Manchester.*

"We desire to express our entire satisfaction with our Synchronome time-circuit. The clocks are perfect timekeepers."—*Yorkshire Woolcombers' Association Ltd.*

"I hear nothing but praise for your clocks on all sides.' —*Professor W. F. Barrett, F.R.S., etc.*

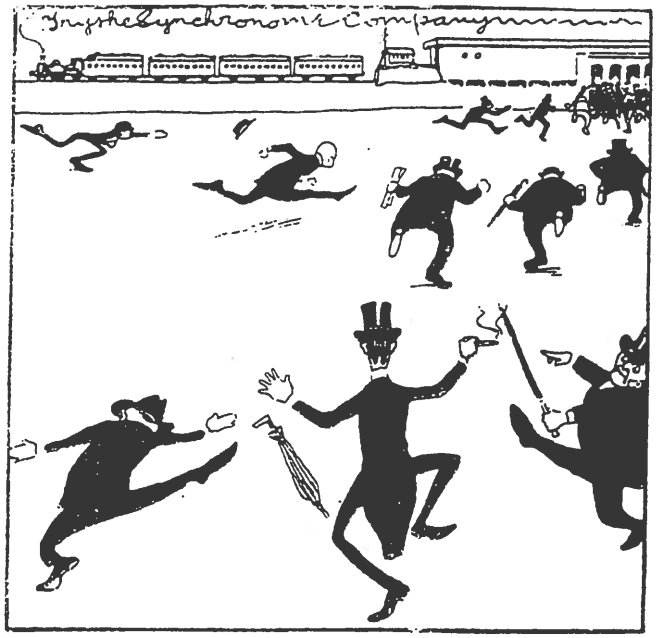
"Please put in hand another 40 dials. Now we do not require to wind up the clocks, and they all keep together; we want one in every room."—*The Authorities of a well-known College.*

This is the PENDULUM
Swinging alone
That times the Switch
Called "Synchronome"
That works the clocks
Throughout the home
That show the Time
That's uniform
All over the House
That Jack Built



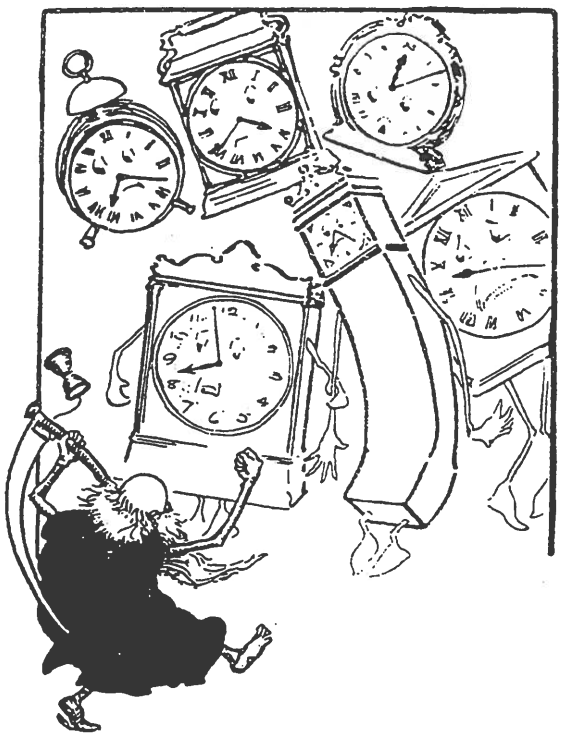
"The system is the admiration of all our friends, and there is no time-keeping in the town to equal it."—*Wrexford Engineering Co. Ltd.*

This is the BATTERY
They are driven by
Or any source of
Electric Supply
Hardly sufficient
To kill a fly
That works the clocks
From dawn to dawn
That show the Time
That's uniform
All over the House
That Jack Built



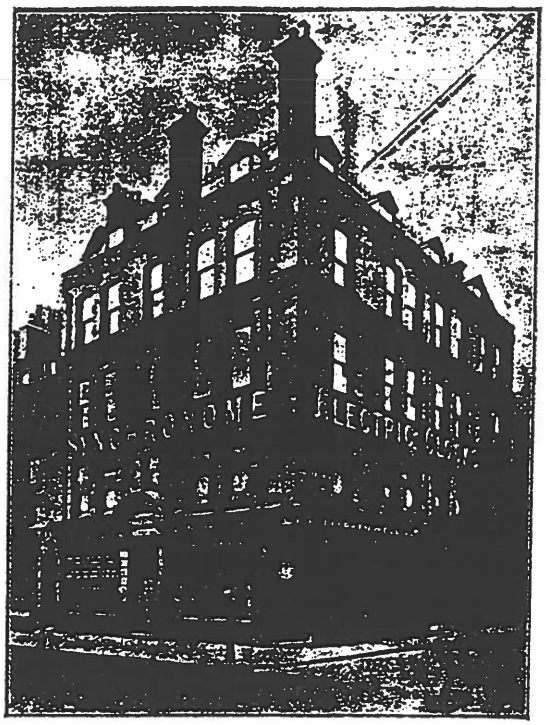
"During the five years they have been installed at our works they have given us every satisfaction."—*W. T. Glover & Co. Ltd., Manchester.*

This is the TRAIN
  Jack caught in the morn
And left his neighbours
  All forlorn
Cursing the day
  That they were born
As they thought of their
  Key-wound clocks with scorn
Compared with the Time
  Which was uniform
    All over the House
    That Jack Built



"I hear nothing but praise for your clocks on all sides."—*Professor W. F. Barrett, F.R.S., Etc.*

These are the CLOCKS
  At sixes and sevens
Which cost so much
  And lie—Oh, heavens!
That have to be wound
  And are never right
So should not be found
  In anyone's sight
No wonder that Jack
  Has put them in pawn
And gone in for the Time
That's uniform
  All over the House
  That Jack Built



This is the PLACE
Where the clocks were born
That woke Jack safely
Up at dawn
That cover the key-wound
Clocks with scorn
That measure the Time
That's uniform
All over the House
That Jack Built

"Synchronome" Electric Clocks

CAN ANYTHING MORE BE ASKED OF THEM?

never want winding up, always show the same time, are correct to within half-a-minute in six months,

and cost no more than ordinary

ARE YOU GOING TO LET THEM IMPOSE UPON YOU ANY LONGER?

eight-day clocks, which are always fast or slow, never even agree among themselves, and are a source of expense in cleaning and repairs.

The Clocks you have may be easily converted.

It will cost you little to drop us a postcard for Price Lists and further particulars, and in the long run it may save you a lot of money and trouble.

DO IT NOW

The SYNCHRONOME ELECTRICAL Co. of Australasia Limited,

BRISBANE.

National Association of Queensland.

"This is to certify that the Synchronome Electrical Co. of Australasia installed in the tower of the grand stand four dials, each 3ft. 10in., with their patent Synchronome movement, and it has given great satisfaction, proving to the public and those interested, very great convenience.

It is purposed, on completion of the grand stands, to install in the dining and other rooms further extensions of the same installation.

The Gladstone Meat Works of Queensland Ltd

"We have very much pleasure in stating that the Synchronome installation of one controller and eight dials has, so far, given us satisfaction. in spite of the disadvantages that the extent and disposition of our works necessitates a lengthy and exposed circuit.

In addition to the advantage of securing uniform time in every department more accurate time, generally, has been maintained on our works, whilst we fully appreciate the convenience of having no clocks to wind by hand."

Post and Telegraph Department, Queensland.

"We have the honour to state that the Synchronome system of clocks installed in the Electrical Engineer's Branch here, about the 10th October last, has since worked satisfactorily. Our first order was for four dials and time switch, and we have since had two old clocks altered for use under the new system, and have ordered two more dials which are not yet in circuit."

Dr. William H. Hoskin, Surgeon, Masterson

"My installation consists of seven clocks, and works admirably and without the slightest trouble or discomfort from one year's end to another, and has proved a great comfort, running from my battery for the past three years."

WIRING AND BATTERY.

The WIRING.—A single line to connect each dial to its nearest neighbour in simple series circuit, as shown in diagram. Ordinary electric bell wire of 18 gauge is electrically sufficient, but for mechanical strength we usually recommend a cheap class of electric light wire 3/22 or 3/20 gauge.

The BATTERY.—Any form of good primary cell, one being required for every 12in. dial in circuit, or two for every three, according to quantity installed. Join up in series.

The Duration of the Contract is exactly what the dials require, and is actually dictated by the self-induction of their magnets. It varies from a 30th to a 50th part of a second, whereas in other systems a whole second is frequently allowed; consequently, the **Consumption of Current** is very small, the total period of closed circuit being about 8 hours per annum. At a current rate of ·3 amp. this means that each dial requires only 2·4 amp. hours per annum. As a good dry cell is capable of yielding from 200 to 300 amp.-hours, it is obvious that the life of the battery depends upon how long it will keep fresh rather than upon the amount of electrical energy consumed by the clocks. If kept in a cool but dry place, it should last from two to four years.

--- MART ---

All MART Ads are FREE, Send copy to the attention of the Editor:
Harvey Schmidt, 75-80 179th St., Flushing, NY 11366. Limit 3 lines.

WANTED: HOROLOGICAL LITERATURE, Repair info, Catalogs, etc. for the Journal
PORTESCAP Secticon Clock or Movement. Antique Watch & Clockmaker's Tools & Machinery.
(718) 969-0847 Harvey Schmidt, 75-80 179th St., Flushing, NY 11366

Junker **EARLY BATTERY CLOCKS**, Movements, Parts, etc, send details.
Martin C. Feldman, 6 Stewart Pl., Spring Valley, NY 10977

ITR, STROMBERG, STANDARD, & SWCC Movements and Parts for Master Clocks. Also Wood Cased Slaves. Call or send photo (914) 997-5670 Mitch Janoff, 3 Stratford Ave., White Plains, NY 10605

ELECTRO-MECHANICAL Clocks, Fancy & Simple Cased. Unusual Clocks, Movements. Books.
Elliot B.Siegel, #2 Oakwood Drive, Lloyd Harbor NY 11743, Day or Night (516) 541-2400 or 351-5869

HANDS for a 13 inch Chapter Ring. (312) 238-3294 - evenings or 445-5381.
G. Frederickson Sr. 1716 W. 100th Pl. Chicago IL 60643

SIMPLEX Movement for Timerecorder, 16 ½" Pendulum. Also wanted **BRILLIE,** Type 1578, 1595, or 1592. Repairable condition, Price. Kenneth Erlenbusch, 124 North Avena, Lodi, CA 95240 (209) 369-5833

SESSIONS Synchronous Motor (or repair thereof) for WM Chime Clocks of mid 1930's. **JEFFERSON GOLDEN HELM** Synchronous Motor (different from Golden Hour Motor).**REMPE** 80beat movement for #44 case. Or will sell/trade case. Len Brenner, 1127 Towne Lake Dr., Longview TX 75601, (903) 233-3222

STANDARD ELECTRIC "Eye Brow style case" for 60 beat movement, 65"x22¾"x9¾".(913) 422-5014
24 v. Electric Motor for **STANDARD ELECTRIC** weight driven Master Clock. 11" Dial w/ Wood Bezel for **STANDARD ELECTRIC** Master Clock. Don R. Mills, P.O. Box 124, Bonner Springs, KS 66012

Plastic Alarm Dial Plate for **SETH THOMAS** 120 v. el. alarm clock, Model POISE E-861-000.
Richard McCahan, P.O. Box 1296,Center Harbor, NH 03226. (603) 253-4110

TIFFANY Double Contact Movement Only (Have case, dial, pendulum)
D. F. Procko, 84 Hazelmere Road, New Britain, CT 06053

ART DECO Table Clocks of any Type as long as Undamaged, Original. Also need **TELECHRON** Digital Clock Model 8B05 Bob Wilkus, 1919 Broadway East, Seattle, WA 98102. (206) 324-4812 eves.

SYNCHRONOME MOVEMENT. Henry Weiland, 8946 W. Grantosa Dr., Milwaukee, WI 53225

SWCC Dial and 2 lb. Bob w/ Wooden Pendulum Rod.
Roy Crowe, 9257 Appleby Street, Downey, CA 90240 (310) 861-8788

N.Y. STANDARD WATCH CO. Movement, 60 beat, in repairable condition, also Dial and Hands.
Elliot B. Siegel, 930 Broadway, Massapequa, NY 11758. Day or Night (516) 541-2400 or (516) 351-5869

TIFFANY NEVER WIND Suspension Unit and Pendulum; Clocks and Parts, any condition.
Ben Bowen, Rt. 3 Box 134C, Monticello FL 32344, (850) 997-3797

Slave Metal Clock w/ 11½" Dial w/ **INTERNATIONAL TIME RECORDING CO. OF NEW YORK ENDICOT, N.Y.** on the Dial. Or Slave Clock, Dial and Case from **I.T.R. CO.**
Bob Smith, 1834 East 29th Street, Brooklyn, NY 11229 (718) 339-9215

IBM Model 25 Master Clock Dial, Hands, Pendulum, Pendulum Scale, and Pendulum Scale Extensions. **Standard Electric** "Eyebrow" Cased Master Clock Dial Face/Pan, and Hands.
Mark Vlasak, 739 Polo Run Drive, Collierville, TN 38017 (901) 854-4406 (evenings)

Electric Clocks by **HAMMOND, WHITEHALL-HAMMOND,** and **HERMAN MILLER.** Also advertisements, catalogs, etc. on same. Collector will pay fair prices. Jack Shelton, 7975 N. Hayden Rd. #C-100, Scottsdale, AZ 85258. (800) 488-1818 x7106. E-mail: a1017@amug.org

Dead Coil Assemblies for **KUNDO's**, Single or Dual Coils, for Possible Rewinding Project. Also "B" **TELECHRON** Rotor, 1 rpm, 50 (fifty) Hz. John R. Seeley, 7541 Meridian St., Miramar FL 33023-4770 (954) 963-7456

Movement for a **HAMMOND** Clock: the required movement has a FRONT ENTERING motor starting knob, mounted just below the hour post. I am advised that this may have been a **SESSIONS** movement with a **HAMMOND** motor. The dial has the legend: "HAMMOND MOTORED". Movement for a **SANGAMO** BANJO CLOCK: the desired movement is electric motor-powered spring wound, with front mounted escapement. The regulator on the escapement is bent at a right-angle so that it extends through the dial. The dial has an opening that is marked: "S-F". If your movement escapement doesn't have the right-angle bend, I think I could adapt it. Mel Kaye, Box 682, Short Hills NJ 07078 (973) 912-0038 FAX (973) 912-8092

Milliammeter from the 1920's, working condition.
Kenneth Erlenbusch, 124 North Avena Ave., Lodi CA 95240, (209) 369-5833 after 4 PM PST.

REPAIR: ALL EARLY BATTERY CLOCKS Specializing in **BULLE** using orig. parts.
Martin C. Feldman, FNAWCC, 6 Stewart Pl., Spring Valley, NY 10977

FOR SALE: **SWCC** Western Union, 15-1/2" convex "glass". Actually it is plastic, but it beats a naked dial. $20.00 (I'll pay UPS up to $5.00) Paul M. Hopkins, 2717 Millwood Rd., Birmingham, AL 35243 (205) 967-1237

BULLE Electric Gallery Clock w/ 12" dial, 17" square overall, walnut wood case w/ pendulum. **BARR** Electric Mantle Clock w/ Glass Dome. **SWCC** Dials and other electric dials and movements.
George Frederickson Sr., 1716 West 100th Place, Chicago IL 60643 (312) 238-3294-evenings or 445-5381

Replacement Field Coils for **SESSIONS** and **HAMMOND** synchronous clock movements.
Wining's Clock Service, 2910 Farmdale Rd., Akron, OH 44312 (216) 628-1654

PUL-SYN-ETIC (pg. 93, 150 Yrs. E. H.) excellent condition, all original & runs $750 **CHROMATIC** (very similar) dirty case, no pend. $250. **MAGNETA** (pg. 89, 150 Yrs. E. H.) case needs refinishing, Howard motion works $450. All 3 for $1200 + shipping
John Perrigo, 5431 Crestview Dr. Hixson, TN 37343, (423) 875-0453 late evenings.

Two rare **F.L. Gregory/Sempire** movements. One is a balance wheel, the other an **F.L. Gregory Clock Co.-Chicago** with original dial. Have other battery clocks for trade. Want; **New England Continuous Electric** or **Banghor Clock Co.** Wall model battery wind.
Steve Cunningham, 3200 Ashland Drive, Bedford TX, 76021, (817)267-9851, Fax (817)267-0387
Continued on Page 24.

Continuation of the Editorial from Page1.

Thanks to Jack Seeley for his original article on Telechron Rotors. We are always looking for material to be published in the Journal; original articles and all other publishable material, i. e. catalogs, instruction sheets, old articles, technical data sheets, etc.

Harvey Schmidt, Secretary-Treasurer

MART for SALE continued from page 23.

McClintock Bank Vault Burglar Alarm, consists of: **E. Howard** 72 hour time switch, **Seth Thomas** 30 day time switch, knife switches, milliammeter, push buttons, and a drop flag annunciator strip. Dated 12/23/35. $750.00 fob Monroe Postman, 10 Yerba Buena, Los Altos CA, 94022 (415) 941-0433

Requests for reprints of previously published material should be directed to the Chapter Historian:
Dr. George Feinstein 75-19 195th Street Flushing, NY 11366

THE ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78 National Association of Watch & Clock Collectors

MEMBERSHIP RENEWAL FORM - 1998

Please print all information:

NAME_____ NAWCC#_____

ADDRESS_____

PHONE NO._____E-MAIL_____

Please check one of the options:
INCREASE DUES TO $15.00_____REDUCE TO 3 ISSUES_____

I wish to RENEW my current membership in the Electrical Horology Society, NAWCC Chapter # 78 and enclose my $10 dues for the year 1998.

SIGNED:_____DATE:_____

HARVEY SCHMIDT, SECRETARY-TREASURER 75-80 179TH STREET, FLUSHING NY 11366